FINAL ENVIRONMENTAL ASSESSMENT

FOR

REMOVAL AND CONTROL OF NONNATIVE CARP

IN UTAH LAKE

TO SUPPORT JUNE SUCKER RECOVERY

Department of the Interior

U.S. Fish and Wildlife Service

January 2010

EXECUTIVE SUMMARY

The purpose of the proposed action is to enhance environmental conditions in Utah Lake, Utah (Figure 1) to improve the recovery potential for June sucker (*Chasmistes liorus*), a species federally listed as endangered under the Endangered Species Act, by reducing the population of common carp (*Cyprinus carpio*). The need for the proposed action is that current environmental conditions, including: 1) a lack of habitat complexity in the form of rooted aquatic plants; 2) degraded water quality; and 3) low biodiversity, limit recovery potential. The goal of the proposed action is to reduce the current population of common carp in Utah Lake by a minimum of 75 percent; maintain the population at or below this reduced level; and, to monitor and evaluate the ecological response of the Utah Lake system. Progress towards recovery of the endangered June sucker has been positive over the past decade in areas such as water management, habitat enhancement, and augmentation. Ultimately, however, ecosystem, community, and species-specific impacts associated with the nonnative common carp population limit the recovery potential for the species. Common carp dominate the Utah Lake fish community, both in numbers and biomass, and through their foraging behavior, eliminate the potential for restoring aquatic plants which provide habitat complexity and cover from predators. A more balanced fish community and productive fish habitat should result from decreased carp numbers in Utah Lake. This action would be undertaken cooperatively by the Utah Ecological Services Office of the U.S. Fish and Wildlife Service (Service), the Utah Department of Natural Resources (DNR), the Utah Division of Wildlife Resources (UDWR), and in coordination with partners to the June Sucker Recovery Implementation Program (JSRIP).

The preferred alternative would reduce the population of common carp in Utah Lake by at least 75 percent of current levels using mechanical removal and would maintain the population at or below this reduced level. Target harvest rates of common carp would be five million pounds annually over a period of six consecutive years. Commercial fishing operations using large nets (primarily seines) would be the principle method to capture and remove common carp from Utah Lake. Other capture techniques such as trapping, electricity, trawling, or baiting may be used in specific, localized situations if determined beneficial. Implementing actions such as this to promote the recovery of June sucker by controlling the effects of invasive species is consistent with the Utah Comprehensive Wildlife Conservation Strategy (Utah Wildlife Action Plan; UDWR 2005), and supports many actions in the approved Recovery Plan for the June sucker (FWS 1999).

The decision is whether the Service will, in cooperation with DNR, UDWR and others: 1) reduce the common carp population in Utah Lake by at least 75 percent and maintain the population at or below reduced levels (preferred alternative); or 2) take no action on removing common carp from Utah Lake. Funding to conduct the first year of the removal effort would be made available through the federal State Wildlife Grants program ($1 million) which constitutes a federal action subject to the provisions of the National Environmental Policy Act of 1969, as amended. USFWS is therefore required to prepare an environmental assessment to analyze the effects on the human

environment and document the findings. The Service, in coordination with DNR and UDWR will review the comments received from the 30-day comment period and will use this environmental assessment to determine if the proposed action is likely to result in significant impacts to the human environment. If it is determined that there are no significant adverse impacts, USFWS will prepare a Final Environmental Assessment and issue a Finding of No Significant Impact (FONSI). If it is determined, conversely, that significant impacts might occur, the Service would be required to prepare an Environmental Impact Statement (EIS). , These documents will be posted on the Service website (http://www.fws.gov/mountain-prairie/federalassistance/) and mailed to those who provide comments on this draft or who request copies.

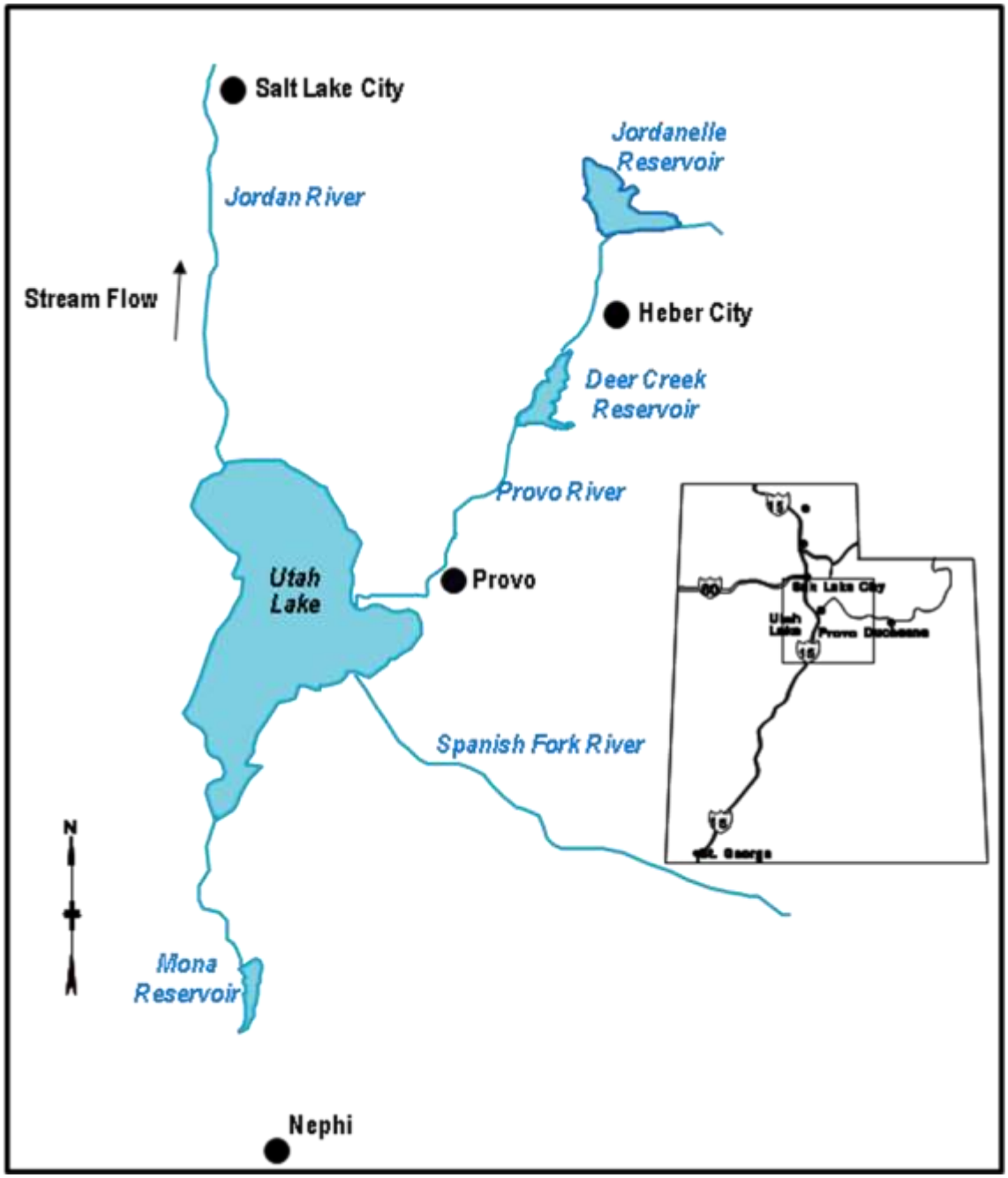

Figure 1: Utah Lake Drainage – The project location would be Utah Lake.

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CHAPTER 1: PURPOSE AND NEED

1.1 Introduction

The Service has prepared this Environmental Assessment (EA) to analyze potential impacts to the human environment (physical, biological and cultural resources, etc.) that may result from nonnative fish control efforts in Utah Lake (Figure 1) to benefit the recovery of the federally endangered June sucker.

This document is organized into six chapters:

- Chapter 1: *Purpose and Need*: Presents information on the background and history that led up to the proposed action, the purpose of and the need for the proposed action and the lead agencies' proposal for achieving that purpose and need. This section also details how the lead agency informed the public of the proposal and how the public responded.

- Chapter 2: *Comparison of Alternatives, including Preferred Alternative*: Provides a detailed description of the lead agency preferred alternative; alternative methods for satisfying the stated purpose and need; and, significant issues raised by the public, preferred alternative proponents, and other agencies.

- Chapter 3: *Affected Environment*: Describes the project environment.

- Chapter 4: *Environmental Consequences*: Describes the environmental consequences of implementing the preferred alternative and the No Action Alternative. This section also includes a summary table of the environmental consequences associated with each alternative. The primary emphasis in this section is a determination as to whether potential impacts would significantly affect the quality of the human environment.

- Chapter 5: *Agencies and persons consulted*: Lists preparers and agencies consulted during development of the EA.

- Chapter 6: *Literature Cited*: Lists documents used in the preparation of this EA.

1.2 Background and History

Shallow Lake Ecology and the Fish Community

Shallow lakes typically have the potential for two alternative stable ecological conditions: a clear water state with a rich array of rooted aquatic plants (macrophytes), and a turbid water state driven by single-celled algae (phytoplankton) production. The pristine state for most shallow lakes is the clear water state. Disturbance can cause a

lake to shift from one state to the other; however, because of ecological feedback mechanisms associated with each state, once a stable ecological state has been achieved a lake has a tendency to remain in that state (Scheffer 1998).

Through impacts associated with human economic developments, many urban shallow lakes have been "disturbed" into the turbid water state. The progression of clear water shallow lakes to the turbid state has typical patterns. As a result of certain types of human economic development, nutrient loading to the lake increases which triggers an increase in phytoplankton abundance. Aquatic plants become covered with a thin layer of algae which inhibits their ability to photosynthesize. Increased phytoplankton in the water column reduces light penetration and as shading increases the aquatic vegetation community eventually collapses.

With rooted aquatic vegetation gone, the aquatic insects associated with the vegetation disappear along with the animals, fish and birds that feed on them or the plants. The refuge that the aquatic plants provided from predation for everything from one-celled aquatic animals (zooplankton) to small fish is also gone which results in major shifts in predator-prey relationships because of increased vulnerability of prey species.

In the absence of the refuge provided by aquatic plants, large zooplankton disappear as a result of increased predation. The disappearance of the zooplankton, which feed on phytoplankton, coupled with nutrient increases further elevates phytoplankton biomass. Without aquatic plants, near-shore wave activity is not suppressed and sediments typically anchored by their roots become suspended in the water column and add to already increased turbidity.

Without aquatic plants, the aquatic invertebrate community becomes dominated by bottom dwelling insects like midges (*Chironomus spp.*). In association, the fish community becomes dominated by bottom feeding species. The digestive activity of bottom-feeding fish promotes nutrient flux from the sediments into the water column (referred to as "internal nutrient loading") and their foraging behavior (mucking around in the mud in search of food) significantly contributes to resuspension of sediments, further contributing to high turbidity (Scheffer 1998).

Through their feeding behavior (i.e. rooting around in bottom sediments in their search for food items), common carp directly affect aquatic plants and prevent their re-establishment. Reflecting on Utah Lake, disturbances that likely contributed to its existing state include elevated nutrient loading from agricultural runoff and sewage disposal, the introduction and establishment of common carp, and lake fluctuations associated with water management. These three factors all affected the survival of rooted aquatic vegetation that provided the refuge that maintained a diverse and stable ecological community.

Large shallow lakes, like Utah Lake have the potential for clear and turbid water states to exist in open connection with large offshore areas that experience wind driven turbidity and near-shore areas, embayments, and river deltas with abundant and diverse aquatic plants that maintain clear water conditions. Vegetated areas provide refuge for

prey species including zooplankton, aquatic insects and young fish and thereby stabilize predator-prey interactions and maintain a more diverse aquatic community (Scheffer 1998).

A mechanism that has been effective at re-establishing the clear water state in many shallow lakes is the reduction of bottom feeding fish coupled with decreases in nutrient loading. The primary bottom feeder in Utah Lake is the common carp, a nonnative species introduced as a food source after native stocks of fish were depleted. In the most recent lake-wide survey conducted, common carp represented an overwhelming 91 percent of the fish biomass (weight) in the lake (SWCA 2005). Because of their rapid growth rates, nonnative common carp soon exceed the size capacity for predators and therefore are a "dead end" in the energy network of the Utah Lake system. In addition, common carp cause conditions which promote their survival over that of other species. Common carp impact June sucker directly through predation and competition, but also indirectly through ecological impacts such as uprooting aquatic vegetation and inhibiting its re-establishment, disturbing sediments which increases water turbidity, and increasing internal nutrient loading. Managers recognize that total elimination of common carp from such a large system is not feasible at this time; however, studies have shown that benefits to shallow lake systems can often be achieved with a 75 percent reduction in bottom-feeding fish populations – as long as the reduced numbers can be maintained (Scheffer 1998).

In Utah Lake the reduction and control of common carp represents a significant challenge. Managers recognize that common carp have a competitive advantage over native fish, including the endangered June sucker, in the existing ecological state of the lake. Enhancement of the Utah Lake ecosystem, and specifically the restoration of habitat complexity in the form of aquatic plants, is necessary to support the recovery of June sucker. The removal of common carp from Utah Lake has been extensively researched and is a major goal of the June Sucker Recovery Implementation Program (JSRIP), which conducts various projects to benefit the Utah Lake ecosystem for the purpose of recovering the June sucker.

Chronology of Nonnative Fish Control Research and Efforts Implemented by the JSRIP

A brief chronology of efforts funded through the JSRIP partnership that led to the development of this environmental assessment follows:

2001 Partners to the proposed JSRIP fund a study to investigate the impacts of nonnative fish on June sucker recovery in Utah Lake and potential mechanisms to control problem nonnative fish.

2002 Federal, State, local and private parties officially form the JSRIP with the dual goals of recovering the June sucker so that it no longer requires protection under the Endangered Species Act (ESA) and allowing continued use and development of water resources for the Wasatch Front – the urban corridor west of the Wasatch Mountains that includes Salt Lake City, Provo and Orem.

The study “Nonnative Fish Control Feasibility Study to Benefit June Sucker in Utah Lake” is completed (SWCA 2002). A risk assessment based on four categories of effects (i.e. predation, competition, abundance, habitat destruction) ranked common carp as the nonnative species with the highest potential for conflict with June sucker recovery. Common carp impact June sucker directly through predation and competition, but also indirectly through ecological impacts such as uprooting aquatic vegetation and inhibiting its re-establishment, disturbing sediments which increases water turbidity, and increasing internal nutrient loading.

2004 The JSRIP approves funding for a study to investigate the feasibility of reducing the common carp population by 75% and 90% and maintaining the population at these reduced levels using mechanical methods (i.e. selective netting). The scientific literature suggests that reducing the common carp population by at least 75% is necessary to achieve an ecological response which would include the re-establishment of rooted aquatic plants and improved water quality.

2005 The study “A Feasibility Study of Mechanical Control and Use of Common Carp on Utah Lake” is completed (SWCA 2005). The study results estimate the number of common carp in Utah Lake at about 7.5 million age 2+ (8 inches or larger) fish. Model simulations indicate that there are also nearly 100 million younger common carp in the lake. At an average of about 5 pounds per adult fish, the total biomass of common carp in the lake is nearly 40 million pounds, or 20,000 tons. At a sustained harvest rate of about 45,000 pounds per day, (or 5.5 million pounds per year) over a 120-day fishing season, the study found that it would be possible to reduce the population by 75% in 6 years and 90% in 7 years. At a current commercial harvest cost of 20 cents per pound, the cost to achieve the desired population levels would be approximately $1.1 million annually and between $6.6 million and $7.7 million for the duration of the removal effort (not counting inflation effects). The study cautioned that common carp numbers would be expected to increase after the initial removal is completed and that low and intermittent harvest efforts would be necessary to maintain the population at desired levels. The study recommended the investigation of suitable markets for common carp including the possibility of locating commercial processors near the lake and providing a stable cost structure to support the commercial harvest and offset costs.

Because of uncertainties surrounding the population estimate provided in the report (SCWA 2005), the JSRIP approved additional funds in 2005 to refine the results provided by the report. A subsequent report was finalized in 2006 (SWCA 2006) and confirmed that the results of the 2004 effort were accurate.

Researchers at Brigham Young University's Plant and Animal Science Department independently explore various commercially viable higher value uses for the common carp, such as; trout and fish feeds, pet foods and treats, organic fertilizer, lipid products (including omega 3 fatty acids), etc. Through small-scale experimentation, a unique low cost liquefaction processing technique was initially evaluated that allows for the harvesting of the protein and fat components of the common carp. Although research and evaluation is ongoing, this liquefaction process uses intrinsic or commercially available enzymes to hydrolyze (liquefy) the common carp tissues to the point that the skeletal bones and scales can be screened off the liquid portion that contains the protein and lipid components of the common carp. The liquid portion can then be further processed to separate the protein from the fat, or the combined product can be evaluated in the preparation of various higher margin products, such as; diets for trout or other fish, pet foods, organic fertilizers (liquid or dry), lipid source (omega 3 fatty acid), etc.

2006 The JSRIP funds a contaminants study on common carp collected from Utah Lake. Common carp tissue was analyzed for metals and pesticides according to the Environmental Protection Agency (EPA) protocols. Results of metals analyses indicated that heavy metal contamination in common carp from Utah Lake is well below EPA standards for human consumption. The results of the pesticides analyses indicated levels of polychlorinated biphenyls (PCBs) are above the EPA standard but well below the Food and Drug Administration (FDA) standard. Because PCB levels exceeded the EPA standard, the Utah Department of Health issued a fish consumption advisory for common carp from Utah Lake; however, because the FDA regulates the commercial sale of fish for human consumption, and PCB contamination in Utah Lake common carp are below their standard, Utah Lake common carp can be sold commercially for human consumption. The goal of this study was to determine if human consumption can be considered as a potential use for carp removed from Utah Lake. Although a consumption advisory is in place for the lake for sport fisherman, human consumption is a potential use for Utah Lake common carp because of a different federal standard applied to the commercial sale of fish,.

The JSRIP approves funding for a pilot study to investigate if removal efforts identified in SWCA 2005 are achievable; however, pilot studies of the magnitude necessary to achieve target levels were not initiated due to logistical constraints.

The JSRIP approves funding to investigate potential uses and marketing strategies for carp removed from Utah Lake and/or carp product. Although several products have been developed in the laboratory setting, transitioning to the scale necessary to effectively use the target levels of carp remains a challenge to overcome.

2007 The JSRIP continues to fund pilot studies investigating harvest methods and investigating potential uses and markets for Utah Lake common carp.

The JSRIP is approached by parties interested in using Utah Lake common carp for compost, mink food and fish meal.

The JSRIP is approached by a party interested in using Utah Lake common carp for humanitarian relief.

The Utah Division of Water Quality releases a pollution loading assessment for Utah Lake as part of an evaluation of beneficial use impairment. This assessment identifies common carp and the removal of aquatic vegetation as a factor in internal phosphorus loading and impaired water quality (UDWQ 2007).

2008 The JSRIP continues with applied research and pilot studies on common carp control and actively pursues funding sources for full-scale common carp control.

The JSRIP conducts a pilot project to create fish meal from Utah Lake common carp using Utah based processing companies.

The JSRIP implements a large scale pilot project to test the feasibility of removing 2.5 million pounds of common carp from Utah Lake in six months, half of the annual removal target necessary to achieve a 75% population reduction in six years. Mechanical removal methods were employed using large commercial seines. Over a six month period, fishing occurs on 71 days and results in the removal of approximately 1.5 million pounds of common carp by one commercial fishing crew, an average near 23,000 pounds per day.

2009 The JSRIP receives a grant from the Service to initiate common carp control efforts.

Entities interested in using Utah Lake common carp for fertilizer, compost, and fish meal continue to approach the JSRIP. The JSRIP solicits proposals to market Utah Lake common carp or related products.

1.3 Purpose and Need for the Proposed Action

The Service is the lead agency for this NEPA document. The Service in coordination with partners to the JSRIP, developed purpose and need statements to guide the planning process. The statements define the underlying need to which the proposed plan and any alternatives must respond, and the attendant purposes for removing and controlling the common carp population in Utah Lake.

The purpose of the proposed action is to enhance environmental conditions in Utah Lake, Utah (Figure 1) to improve the recovery potential for June sucker (*Chasmistes liorus*), a species federally listed as endangered under the Endangered Species Act, by reducing the population of common carp (*Cyprinus carpio*). The need for the proposed action is that current environmental conditions, including: 1) a lack of habitat complexity in the form of rooted aquatic plants; 2) degraded water quality; and 3) low biodiversity, limit recovery potential.

1.4 Decision to be Made

The decision is whether the Service will, in cooperation with DNR, UDWR and others: 1) reduce the common carp population in Utah Lake by at least 75 percent and maintain the population at or below reduced levels (preferred alternative); or 2) take no action on removing common carp from Utah Lake. Funding to conduct the first year of the removal effort would be made available through the federal State Wildlife Grants program ($1 million) which constitutes a federal action subject to the provisions of the National Environmental Policy Act of 1969, as amended. USFWS is therefore required to prepare an environmental assessment to analyze the effects on the human environment and document the findings. The Service, in coordination with DNR and UDWR will review the comments received from the 30-day comment period and will use this environmental assessment to determine if the proposed action is likely to result in significant impacts to the human environment. If it is determined that there are no significant adverse impacts, USFWS will prepare a Final Environmental Assessment and issue a Finding of No Significant Impact (FONSI). If it is determined, conversely, that significant impacts might occur, the Service would be required to prepare an Environmental Impact Statement (EIS). ,

If the preferred alternative is implemented, the Service, in cooperation with partners to the JSRIP, would initiate common carp removal and control efforts on Utah Lake. Monitoring the ecological response of implementation of the preferred alternative would occur in cooperation with the UDWR. In addition to the funding that would be made available to conduct the first year of the removal effort through the federal State Wildlife Grants program ($1 million) a required match in non-federal funding through Utah's Endangered Species Mitigation Fund ($500,000) would be made available. However, at this time funding is not available for the additional five years required to fully implement the preferred alternative.

1.5 Public Involvement

Beginning in 2009 the Service engaged in numerous efforts to reach stakeholders and constituents that might have an interest in the proposed common carp removal project and to identify potential issues and concerns associated with the proposed project. These efforts included newspaper ads, email notifications, press releases, a scoping meeting and a 14-day comment period. In addition, since 2004 the JSRIP has been engaged in extensive common carp removal outreach to share research findings, alternative actions and studies with individuals and groups through meetings, conferences and symposiums, briefings, news stories, and a comprehensive website .

Scoping Meeting

A public scoping meeting to provide information regarding the common carp removal program and to seek input for the preparation of this environmental assessment was held on June 3, 2009 at the Orem Junior High School in Orem, Utah. Several methods were used to notify stakeholders about the scoping meeting. On May 24, 2009, 3-inch by 6-inch display ads ran in The Salt Lake Tribune, Deseret Morning News and Provo Daily Herald. A news release was also distributed to key media outlets, which resulted in stories regarding the public meeting in the Daily Herald on June 2, 2009, and The Salt Lake Tribune on June 3, 2009. Notification of the meeting was distributed by e-mail to 241 individuals and/or stakeholder groups including environmental interests, anglers, Utah Lake users, bird-watchers, members of the Utah Lake Commission and past open house attendees. These emails also encouraged stakeholders to forward the information to others who might have interest. A Twitter update was also made for those people on the JSRIP's stakeholder list and who are Recovery Program Twitter followers.

There were 27 people who attended the scoping meeting, 21 of whom filled in information on the sign-in sheets. Attendees included representatives from the Service, the JSRIP, other state and federal agencies, Utah Lake boaters, Utah Lake anglers, Utah Lake commercial fishermen, local environmentalists, local residents and other Utah Lake users.

A PowerPoint presentation provided an overview of the proposed common carp removal project, its need and purposes, scientific studies conducted, alternative actions, potential environmental impacts, the NEPA process and timeline. Following the presentation there was open discussion and a question and answer period. Questions and comments from the public were logged and analyzed to discern if there are any issues of concern. Pertinent issues are included and evaluated in this EA. Following the question and answer period, attendees were invited to look over 5 separate informational boards, talk with experts on hand and submit comments either at the meeting or by mail, fax or email by June 17, 2009. A printed fact sheet that also contained a self-mailing comment sheet was given to all those in attendance.

Utah Lake Festival Exhibit

During the sixth annual Utah Lake Festival held on June 6, 2009, the JSRIP set up a table and informational boards describing the proposed common carp removal project, and had representatives from the JSRIP on hand to discuss the project, answer questions and

encourage people to fill out a comment sheet to submit that day or by mail, fax or email by June 17, 2009. Approximately 3,000 to 3,500 people attended the Festival, many of whom visited the JSRIP exhibit.

Utah Lake Fish Forum

On June 9, 2009, an email was sent by the Chair of the Utah Lake Fish Forum, a stakeholder involvement process to assist the Utah Division of Wildlife Resources (UDWR) in management decisions regarding the Utah Lake fishery, to its 36 members encouraging them to submit comments regarding the proposed common carp removal project. The email summarized the public scoping meeting that had been held on June 3, 2009, and included the scoping meeting's PowerPoint, and electronic versions of the informational boards that had been displayed and the fact sheet/comment form.

Comments Received

As mentioned above several mechanisms were used to inform stakeholders about the common carp removal project and to solicit comments. The comments received provide the Service and the JSRIP with valuable information to determine if there were issues and needs to be aware of with the project. Only two written comments were received following the scoping meeting. Both of these comments were supportive of the proposed common carp removal project.

The decision will occur after a 30-day public review of this draft environmental assessment, and after consideration of all public comments received during the comment period. If the alternative selected would cause significant adverse impacts on the human or natural environment an Environmental Impact Statement would be prepared prior to implementing the alternative. If no significant adverse impacts are anticipated, a Finding of No Significant Impact would be prepared and the environmental assessment would be finalized. These documents will be posted on the websites of the Service (www.fws.gov/mountain-prairie/federalassistance) and the JSRIP (www.junesuckerrecovery.org) and will be mailed to those who provide comments on this draft or have requested copies.

Public comments/questions received as a result of outreach to date can be summarized as follows:

- What is the duration of implementation of the preferred alternative?
- What will be the composition of the fish community with common carp removed?
- How would the carp be disposed?
- What is the total cost and what is the source for funding the preferred alternative?
- Why not just sell the carp?

Common carp are considered "protected wildlife" under Utah law and therefore fall under the management authority of UDWR. UDWR "is the wildlife authority of Utah . . . [and] shall protect, propagate, manage, conserve and distribute protected wildlife throughout the state. . .

[and] is appointed as trustee and custodian of protected wildlife (Utah Code 23-14-1)." In a letter dated June 16, 2009, the UDWR provided the following comments in response to public scoping:

- UDWR supports the proposed carp removal project
- The proposed project will benefit Utah Lake and the State of Utah both ecologically and economically
- Common carp are a primary threat to the recovery of June sucker
- A significant reduction in common carp will facilitate growth of aquatic vegetation and improve water quality
- Rooted aquatic vegetation will serve as a thermal and predatory refuge for young June sucker
- Rooted aquatic vegetation will buffer wave activity and decrease wind-driven turbidity
- Reducing common carp will improve water quality by reducing internal nutrient loading
- Improving the Utah Lake ecosystem through carp removal should increase recreational fishing opportunities and as a result provide angling-associated revenues to local economies

Comments received during the public review of this draft EA will be summarized in the Final EA and incorporated into that text as appropriate.

CHAPTER 2: DESCRIPTION OF ALTERNATIVES

2.1 No-Action Alternative

Under a No-Action alternative, a carp removal program would not be implemented on Utah Lake by the JSRIP. The relatively warm and productive nature of Utah Lake provides prime habitat for spawning and recruitment of common carp. Since the introduction of carp to the Utah Lake watershed in the late 1800's, the carp population has grown to dominate the Utah Lake fish community (SWCA 2006). Bottom-feeding common carp have had a dramatic effect on the Utah Lake ecosystem by contributing to a shift from a system driven by rooted aquatic plants to one dominated by algae (Miller and Crowl 2006). Utah Lake historically was described as having large aquatic plant beds throughout the lake. Currently, the lake is in turbid stable state with high blue-green algal densities and high suspended solids.

2.2 Alternative A, Preferred Alternative (Mechanical Removal of Common Carp)

Mechanical Removal to Reduce the Common Carp population in Utah Lake: Commercial fishing operations would use boats, large nets (primarily seines) and hand labor to capture and remove about five million pounds of common carp annually from Utah Lake over a six year period. The use of trapping, electricity, trawling, or baiting may also be used in specific, localized situations such as tributaries, canals, nearshore areas or other areas where larger seines cannot be effectively deployed. Carp would be transported to various existing access locations around the lake for offloading and disposal outside of the lake environment. Carp would not be disposed on the shores of Utah Lake.

The JSRIP would contract with commercial fishing operations to remove common carp through fishing methods approved by the Utah Division of Wildlife Resources (UDWR). Fishing operations are proposed to occur for at least 120 days per year primarily from September to April, the time of year our experience and earlier pilot efforts have indicated are most effective for carp removal. Activities may extend outside these times if conditions are favorable and if needed to meet the annual removal target of five million pounds of carp.

Two to three fishing crews operating boats for fishing and transport of catch would be employed in this effort. A crew would typically consist of four to five people in three boats. Two boats are necessary for efficient seining, while the third boat would be used for transport. Between 10 and 20 boatloads of carp per day would move from open water to offloading points around the lake in order to catch and remove a target of at least 46,000 pounds of carp per day over the 120-day period. All commercial fishing operations are required to comply with the State of Utah's regulations relating to the commercial harvest of fish, including the acquisition of appropriate permits and certificates of registration. The UDWR has the authority to manage fish and wildlife

resources of the State and would approve appropriate fishing methods and equipment and establish all rules for the species and number of fish that can be removed. All activities will be regulated under existing state law.

Fishing may take place during winter conditions when ice cover is present on Utah Lake. Winter fishing would typically involve one to two crews, each consisting of five to eight people working on top of the ice. Nets would be deployed through a series of 50 to 70 holes (2 foot by 2 foot) in the ice and retrieved to a large "take-out" hole (10 foot by 5 foot). Fish are removed through the "take-out" hole and transported to the shore by trailer.

This large scale removal effort may require some facility improvements to facilitate the deployment of commercial fishing equipment and the offloading of fish from fishing boats. The installation of breakwater features or improvements to boat launching facilities may be required. Launching of commercial fishing boats requires a smooth sloping surface adjacent to the lake. While suitable boat launching conditions can be found in multiple locations around Utah Lake, it may be necessary to conduct limited vegetation removal and adding fill material to facilitate launching. Offloading of captured fish involves transferring fish from the boat to a transport trailer, usually by mechanical conveyor or winch. Offloading would require access that would allow a trailer close proximity to the water surface. Calm water conditions are also necessary to efficiently transfer fish from boat to trailer. The addition of fill or concrete barriers as breakwater features may be necessary to allow for calm water conditions. Exact locations for such improvements are not known at this time, but any efforts would comply with State of Utah Division of Forestry, Fire, and State Lands regulations and the Clean Water Act.

The JSRIP would continue public outreach efforts to explain the reasons for the removal of common carp and to provide information regarding the progress of the project. Public outreach would be conducted primarily by press releases at least twice a year, at project milestones, and as interest is shown by the media. Updates would also be provided at public events hosted by the JSRIP. Outreach efforts would include information to inform the public about the value of the Utah Lake ecosystem and the recovery of June sucker.

Incidental take of June sucker would be minimized by using gear types that reduce the likelihood of June sucker capture, limiting harvest efforts to areas outside of where June sucker are known to congregate, and removing June sucker from the catch and returning them to the lake unharmed as soon as they are observed. The current augmentation of the Utah Lake June sucker population from culture and refuge facilities would more than offset any incidental take associated with large-scale harvest. The brood stock for hatchery-raised June sucker was established from wild fish over a 15-year period, beginning in the early 1990's, in an effort to capture the genetic diversity of the species before wild stocks completely disappeared.

Disposition of Removed Fish: Common carp removed as part of the preferred alternative may be used in a number of disposal opportunities; however because of lack

of sufficient information, at this time the proposed disposition of the fish is local landfill facilities. Disposal in this manner would increase traffic to local landfill sites by 120 truckloads per year and deposit five million pounds of fish per year into the landfill. The South Utah Valley Solid Waste District (SUVSWD) is located on the south west side of Utah Lake, roughly 7 miles northwest of the town of Elberta. In 2008, the SUVSWD received 142,954 tons of municipal waste (Utah Division of Solid and Hazardous Waste 2009). The proposed action would result in 2,500 additional tons of fish being deposited annually. At a rate of $27 per ton, disposal in this manner may cost $67,500.

While several other disposal possibilities exist, information about each is limited at this time. The possibilities are described below as sub-alternatives to Alternative A. If one or more of these possibilities becomes a viable option they would be evaluated as an addendum to this environmental assessment. Disposal of all of the common carp removed from Utah Lake over the multiple year project may require utilizing multiple disposal options:

- Use of common carp in marketable products. The JSRIP has funded studies for the commercial uses of common carp and removed fish and how they may be used to produce products such as fish meal, fish oil, fertilizer, pet food, or products for human consumption. If a profitable opportunity presents itself, the JSRIP may work cooperatively with private entities to produce such products. Revenue from the sale of such products would be used to offset the cost of removal and reduce the overall cost of the carp removal project.

  Creating a marketable product from removed common carp might require the establishment of processing facilities in the vicinity of Utah Lake. The size and structure of such a facility would depend on the product being produced. Ideally, the facility would be constructed as close as possible to Utah Lake to reduce the amount of effort needed to and impact of transporting fish to the facility. The location for such a facility may depend on the proposal for processing.

  Multiple entities have expressed interest in using the common carp harvested from Utah Lake to create a marketable product. It remains to be seen if any of these entities are capable of providing the capital to construct processing facilities and develop a suitable market for the product. The JSRIP would continue to work with those entities interested in creating marketable products from Utah Lake common carp.

- Non-revenue generating uses. By working with local entities, the removed common carp may also be disposed of by means that would not provide revenue to reduce project costs. These options include supplying the fish to local fur-breeders for use in mink feed and mixing the fish with green waste to create compost. These non-revenue generating uses have been used in pilot removal projects conducted on Utah Lake.

  These uses provide means for disposing of the removed fish without the

construction of processing facilities or the costs of landfill disposal. As such, they represent lower cost options for disposal, but do not generate revenue to reduce the overall cost of the project. The greatest cost associated with these uses involves the transport of fish to the disposal sites. With an average daily catch of approximately 46,000 pounds, we would expect 120 truckloads of carp to be transported to these disposal areas each year. However, end users may also take delivery at the shore to eliminate such costs.

Currently, the local fur-breeders and composting facility are not capable of using five million pounds of carp annually. If other users are identified it may be possible to increase the amount of carp that may be disposed of in this manner, otherwise fish exceeding the capacities of these uses would need to be disposed of in a different manner, likely going to the local landfill.

Monitoring: The JSRIP would provide observers on-board commercial harvest boats to monitor the carp removal and catch of non-target species, particularly endangered June suckers. Observers would track the number of pounds of carp removed annually from the lake to determine if removal goals are being met. In addition, the relative abundance and size of common carp captured and/or remaining in the lake would be assessed to evaluate the effectiveness of removal on the carp population along with the response of other fish species to the removal effort.

Once removal targets are achieved, however, fish community monitoring would be required to track common carp population dynamics and ensure that the population does not rebound after the initial removal effort. Until technology provides a more effective method for selectively removing problem species, like common carp, fish community monitoring to ensure that the common carp population does not rebound would be conducted indefinitely. Smaller scale removal efforts as part of the long-term monitoring would keep the common carp population at reduced levels and allow the recovery of the June sucker and the Utah Lake ecosystem. These efforts to maintain a reduced common carp population would be accomplished through commercial fishing, UDWR management, research activities, and/or other mechanisms.

Additionally, ecosystem-level monitoring would be conducted to evaluate the response of the ecosystem to carp removal. Ecosystem-level monitoring would be conducted to track the response of certain key components, including algae, zooplankton, rooted aquatic plants, invertebrates, limnology, and water quality, to a reduction in common carp population as an effort to document whether the desired ecosystem shift occurs.

Project Cost: Project costs for this alternative are expected to range from $1 million to $1.5 million annually for six to seven years. However, depending on the disposal options, the costs may be partially offset by revenue generated by the sale of products produced from the removed fish. Costs for the preferred alternative would include personnel time, commercial fishing costs, monitoring, disposal, and equipment.

2.3 Alternatives Considered but Not Analyzed

During the early planning phases, several alternative actions for meeting the purpose and need were considered but eliminated from further analysis as described below.

• *Poisoning common carp by chemical piscicides*: The chemical treatment of water bodies is practiced in many regions by management agencies to remove unwanted fish species. Rotenone, an extract from the roots of a tropical plant, is commonly used. The typical method involves the simultaneous treatment of the entire water body and its tributaries. For a large water body such Utah Lake, these methods rarely result in the elimination of the target species due to the size and complex nature of the watershed and the availability of untreated refuge areas. However, these methods have been successful in some systems over the short term to reduce unwanted species allowing a temporary recovery of the natural system. The use of chemicals and fish poisons to reduce common carp in Utah Lake has been evaluated and determined to not be feasible (SWCA 2002). The volume of Utah Lake would not allow for rotenone concentrations necessary for successful treatment. Also, the number of canals, tributaries, and springs (which frequently provide desirable habitat which may harbor common carp) that would need to be treated simultaneously would make it difficult to conduct a treatment that would have long lasting effects. In addition, such chemicals are not species specific so lake-wide chemical treatment would kill large numbers of non-target fish and invertebrates. Fish poisons would also likely adversely impact the endangered June sucker, resulting in an unacceptably high level of incidental take.

• *Biological Control*: Biological control has been used to control problem species in many systems throughout North America. Biological control is the active use of one population of organisms to control the population of another. Methods often involve introducing a competitor or a predator to out compete or prey upon a nuisance species. In Utah Lake this method could be utilized by either introducing a competitor or a predator that would impact carp growth and recruitment to the adult population. Disadvantages of this method include the introduction of additional nonnative species to Utah Lake and the potential establishment of these species in other areas of the Utah Lake watersheds. In reality there are no known common carp predators or competitors that could realistically be introduced into Utah Lake. Moreover, the effect introduced species would have on the entire Utah Lake fish community would need to be understood prior to any introduction of a new species.

• *Species-specific Disease or Parasites*: The use of diseases (e.g. carp herpes virus) or parasites specific to common carp could be effective at controlling common carp, but because of unknown risks associated with such an approach, introduction of foreign diseases or parasites would not be considered.

• *Carp Bounties:* The development of a bounty on Utah Lake common carp would involve paying individuals who take common carp from the lake and bring them into a collection site. Anyone who could catch common carp using legal methods could participate. The advantage of this scenario is the potential involvement for large

numbers of participants, and the publicity surrounding local activities. Using this method has many potential disadvantages including diffuse unreliable catch rates, difficulty in regulation, increased cost in management, potential for fish being captured and brought from outside the watershed, increased use of illegal methods, potential public relation difficulties, unregulated by-catch, loss of control in monitoring, and potential increased risk to public safety. The Service and JSRIP have concluded that bounties would not be effective in removing the quantity of carp necessary to meet the project need.

- *Water Management*: Excessive lake level fluctuations are considered a contributing factor in reducing rooted aquatic plants. Rooted aquatic plants do not survive if bottom sediments are exposed during extended periods of lake drawdown. The JSRIP has funded work to evaluate pre-water development fluctuation patterns of Utah Lake elevation and changes that resulted from upstream water development and the use of the lake as an impoundment to deliver water to downstream users (CUWCD 2007). Findings include that under recent historical conditions over the past 50 years, lake levels fluctuated by an average of 3.5 feet annually. For pre-water development conditions, the average fluctuation was only 2.1 feet, and minimum water levels were higher than under historical/post-water development conditions. Much of the effect of water operations on Utah Lake levels, however, is expected to be corrected under current and planned conditions where the simulated average annual fluctuation is 2.5 feet. This is mainly from reduced demands for Utah Lake water as water rights are exchanged upstream to municipal water users and held in the lake to improve operations of the Central Utah Project. Because of high turbidity levels associated with the existing carp population in Utah Lake, light penetration is very limited and the restoration of rooted aquatic plants would not occur through water management alone. Indeed, however, the future simulated fluctuations in concert with implementation of the preferred alternative should benefit the re-establishment of rooted aquatic plants.

Water removal (i.e. lake drawdown) was considered as a means to improve capture efficiency for carp; however, Utah Lake is managed as a storage reservoir for downstream water users and also serves a function in the operation of the Central Utah Project (Utah Lake Interim Distribution Plan 1993). Because of complications associated with multiple water rights holders associated with the operation of Utah Lake and the requirement to operate the lake under Utah Water Rights Law, revision to the current water operations of Utah Lake was eliminated from consideration.

- *Water Quality*: Utah Lake is on Utah's Clean Water Act §303(d) list of impaired waterways, exceeding state criteria for total phosphorus (TP) and total dissolved solids (TDS) concentrations. Total phosphorus is a nutrient that contributes to plant growth in aquatic systems in much the same way as it promotes the growth of agricultural crops and gardens. At low concentrations, it is critical to sustaining a healthy ecosystem but at elevated concentrations it can have detrimental effects. General concerns associated with elevated total phosphorus concentrations include the growth of nuisance algae, low dissolved oxygen, elevated pH, and the potential for cyanotoxin production by cyanobacteria (blue-green algae) which can result in

fish kills. Utah Lake regularly experiences large algal blooms, generally during the late summer and fall. Waste Water Treatment Plants (WWTP) contribute the largest portion of the calculated TP loading to the lake at 76.5 percent (UDWQ 2007). Because WWTP represent point-specific sources of TP, potential control on the majority of phosphorus loading to Utah Lake is feasible; however, it is also very costly and there are no immediate plans to retrofit existing WWTP with phosphorus control. Because of the implication of nutrient loading on the current status of the Utah Lake ecosystem, in addition to implementation of the preferred alternative, nutrient control may also be a necessary future action to recover June sucker.

CHAPTER 3: AFFECTED ENVIRONMENT

3.1 Location

Utah Lake lies west of Provo, Utah, and at 96,000 surface acres, is one of the largest natural freshwater lakes in the western United States (Figure 1). It is 38 km (23.6 mi) long and 21 km (13 mi) wide (Radant and Sakaguchi 1981), and is at an elevation of about 1,368 m (4,489 ft). The lake is relatively shallow, having an average depth of 2.8 m (9.2 ft) and maximum depth of 4.2 m (13.8 ft). The lake is the terminus for the Provo, Spanish Fork, and American Fork rivers. The outflow of Utah Lake is the Jordan River, which flows 65 km (45 mi) north into the Great Salt Lake, a terminal basin.

3.2 Water Quality and Supply

Utah Lake is a natural lake remnant of Pleistocene-era Lake Bonneville that has been modified by man into an operational water supply reservoir by means of a dam and outlet works constructed in 1872 at its natural outlet to the Jordan River in north Utah County, Utah. Utah Lake has been significantly altered by three main factors: 1) its operation as a storage reservoir; 2) introductions of nonnative fish; and, 3) increased nutrient loading from agricultural practices and sewage disposal. Nonnative common carp were introduced as a food source for early settlers to the area in the late 1800's (SWCA 2006). Nutrient loads have increased as a result of agricultural runoff and sewage disposal, and Utah Lake is currently listed as impaired for total phosphorus concentrations (DEQ 2004).

Utah Lake can store approximately 870,000 acre-feet of water at the water level maintained by the dam at the head of the Jordan River (Fuhriman et al. 1981). The average annual developed water supply is 790,300 acre-feet. Agricultural irrigation uses most of the developed water supply with 453,700 acre-feet diverted annually. Municipal and industrial uses divert 141,345 acre-feet in the average year. The remainder of the water supply is used for lawn and garden irrigation, secondary water systems, and providing instream flow.

The Provo River is the largest tributary to Utah Lake. The average discharge for years 1953-1967 of the Provo River above Deer Creek Dam is 256,000 acre-feet per year. Of this amount, about 200,000 acre-feet originates within the drainage basin and the remaining 56,000 acre-feet is imported from other basins. The second largest tributary to Utah Lake is the Spanish Fork River, with its tributaries Diamond Fork and Thistle Creek. Other significant tributaries to Utah Lake include Hobble Creek and the American Fork River.

Common carp introductions have been blamed for loss of water clarity and biodiversity in many shallow lakes worldwide (Zambrano et al. 2001). Bottom feeding common carp are believed to have significant negative impacts on the Utah Lake ecosystem, influencing internal nutrient cycling by their rooting activity and excretion of wastes

(SWCA 2002: Crowl & Miller 2004; Miller 2004; Miller 2006). Chumchal et al. (2005) found a significant positive relationship between total phosphorus and carp biomass through research conducted on ten experimental ponds.

Total phosphorus levels in Utah Lake exceed the pollution indicator level of 25 ug/l averaging 46.66 ug/L in 2004 and 2005. The lake is listed on the Utah Department of Environmental Quality's 303(d) list of impaired waters (Valdez et al. 2006; DEQ 2004) and investigators have classified the lake as either eutrophic or hyper-eutrophic for the last 25 years. Waste Water Treatment Plants (WWTP) contribute the largest portion of total phosphorus loading to the lake at 76.5 percent. Because of their ability to act as nutrient pumps, releasing nutrients into the water column through their digestive activities and through sediment resuspension as a result of their foraging behavior, the Utah Lake TMDL identified common carp as one of the probable factors reducing water quality in Utah Lake (UDWQ 2007).

3.3 Vegetation

Historically, Utah Lake was dominated by rooted aquatic vegetation which probably protected the shorelines and shallow lake areas from wind-driven wave disturbance, thereby reducing turbidity levels (Wakefield 1933). Studies conducted in the 1970's found seven major plant community types associated with Utah Lake that included pondweed, bulrush-cattail marshes, spikerush-bulrush meadows, lowland woody vegetation, saline terrestrial vegetation, and annual herbaceous vegetation (Coombs 1970). The introduction of common carp has led to a significant reduction in aquatic vegetation (Petersen 1996; Crowl et al. 1998), and this reduction in aquatic vegetation has been implicated in changing the lake from a complex clear-water system to a simplified system with increased turbidity and poor water quality. Primary productivity in Utah Lake was driven historically by rooted aquatic plants and today is driven primarily by algae. Aquatic vegetation has changed from a pondweed, spikerush, bulrush-cattail marsh dominated community to a simplified community made up mostly of large stands of phragmites (*Phragmites australis*).

3.4 Soils

Utah Lake has little rocky substrate and is generally soft-bottomed. The bottom of the lake is 93-99% soft mud like sediment, also called soft silt ooze (Utah Lake Research Team et al. 1982). This unconsolidated calcareous sediment has a high proportion of calcium carbonate, or marl, in combination with impurities such as clay, quartz, and other minerals. The most abundant substrate other than soft silt ooze is sand and comprises 5.6% of the lake bottom. Water level fluctuations due to water storage management, natural tributary runoff and evaporation significantly affect littoral zone substrate composition and the availability of rocky substrate to aquatic organisms. Because of the predominantly soft substrate in Utah Lake, the benthic rooting behavior of carp has a disproportionally negative affect on the lake ecosystem through increased turbidity and the prevention of established rooted aquatic vegetation.

3.5 Air Quality

Air quality around Utah Lake is similar to that in all of Utah County. The U.S. Environmental Protection Agency sets National Ambient Air Quality Standards (NAAQS) for pollutants that have the potential to cause health problems and are partially associated with transportation and industrial activities. In Utah County, pollutants that have been identified as exceeding NAAQS include PM_{10} and carbon monoxide (UDAQ 2006). The pollutant PM_{10} is classified as particulate matter that is less than ten microns in diameter. Both PM_{10} and carbon monoxide are primarily associated with transportation. The State of Utah and local municipalities are working to reduce PM_{10} and carbon monoxide pollution.

3.6 Terrestrial Wildlife

Utah Lake lies within the Great Basin Flyway and is an important resource for migratory birds such as waterfowl, shorebirds, neotropical songbirds, and raptors. Utah Division of Wildlife Resources has documented the presence of Canada goose, mallard, cinnamon teal, gadwall, northern pintail, northern shovler, American white pelican, raptors, shorebirds, and many of the neotropical birds but specific surveys to document breeding have not been conducted. It is assumed that these species use the lake for breeding as there are two areas within the lake (Provo and Goshen bays) that provide suitable breeding habitat for waterfowl. It is also assumed that avian species use the lake as a source of food and as a stopover for periods of rest. Populations of native mammals, reptiles, invertebrates, and plants also occur along the Utah Lake shoreline and its tributaries and utilize the lake as habitat and a source for food. Table 1 (below) is a list of the sensitive terrestrial organisms likely to occur within the project area.

Table 1. Sensitive terrestrial organisms likely to be found within the project area.

	Common Name	Scientific Name
Reptile		
	Milk snake	*Lampropeltis triangulum*
	Smooth green snake	*Liochlorophis vernalis*
Plant		
	Ute ladies' tresses	*Spiranthes diluvialis*
Mammalia		
	Spotted bat	*Euderma maculatum*
	Townsend's big-eared bat	*Corynorhinus townsendii*
	Brazilian free-tailed bat	*Tadarida brasiliensis*
	Northern river otter	*Lontra Canadensis*
Avian		
	Northern goshawk	*Accipiter gentilis*
	Osprey	*Pandion haliaetus*
	American white pelican	*Pelecanus erythrorhynchos*
	Swainson's hawk	*Buteo swainsoni*
	Ferruginous hawk	*Buteo regalis*
	Greater sage grouse	*Centrocercus urophasianus*
	Long-billed curlew	*Numenius americanus*
	Caspian tern	*Sterna caspia*
	Black tern	*Childonias niger*
	Yellow-billed cuckoo	*Coccyzus americanus*
	Burrowing owl	*Athene cunicularia*
	Short-eared owl	*Asio flammeu*
	Black swift	*Cypseloides niger*
	Common yellowthroat	*Geothly pistrichas*
	Blue grosbeak	*Guiraca caerulea*
	Bobolink	*Dolichonyxoryz ivorus*

3.7 Fish and Aquatic Wildlife

Utah Lake supports a diverse community of aquatic species that include fish, amphibians, and invertebrates.

Native fish that were historically found in Utah Lake were: Bonneville cutthroat trout (*Onchorynchus clarki utah*), June sucker, Utah sucker (*Catostomus ardens*), Utah chub (*Gila atraria*), mountain whitefish (*Prosopium williamsoni*), mountain sucker *(Catostomus platyrhunchus*), Bonneville redside shiner (*Richardsonius balteatus hydroflox*), speckled dace (*Rhinichthys osculus*), longnose dace (*Rhinichthys cataractae*), leatherside chub (*Lepidomeda aliciae*), least chub (*Iotichtys phlegethontis*), Utah Lake sculpin (*Cottus echinatus*), and mottled sculpin (*Cottus bairdi*). Of these, only the June sucker and Utah sucker still occur in Utah Lake. Utah chub, redside shiner, southern leatherside, speckled dace, mountain sucker, longnose dace, and mottled sculpin can still be found in most Utah Lake tributaries. Mountain whitefish can still be

found in the Provo River. Utah Lake sculpin, another Utah Lake endemic, is considered to have gone extinct in the 1930's, and least chub have been extirpated from Utah Valley. Cumulative effects (i.e. competition, predation, and habitat alteration) of introductions of nonnative fish species into the Utah Lake system, which began in the late 1800's, has been implicated as one of primary causes in the decline of the June sucker, as well as the other native fish in Utah Lake.

Thirty species of nonnative fish have been introduced into the lake, either intentionally or accidentally, and 16 have become established (SWCA 2002). Introductions that have proved to be particularly successful include common carp, white bass (*Morone chrysops*), black bullhead (*Ameiurus melas*), channel catfish (*Ictalurus punctatus*), walleye (*Stizostedion vitreum*), largemouth bass (*Micropterus salmoides*) and black crappie (*Pomoxis nigromaculatus*). The most abundant and pervasive species since the early 1900s is the common carp (Carter 1969; White and Dabb 1970; Radant and Sakaguchi 1981; Crowl et al. 1998; Thompson and Wiley 1988). Common carp were first introduced into Utah Lake in 1881 with large numbers being imported between 1881 and 1903 (Popov 1949). Although, predation associated with introduced non-native fish species poses a threat to June sucker, it is believed that if habitat complexity in the form of rooted aquatic plants is restored in the Utah Lake system as a result of carp removal, sufficient numbers of young June sucker will be able to use vegetation for cover and avoid predation.

Two sensitive species of native amphibians historically found in wetland habitats adjacent to Utah Lake were: Columbia spotted frog (*Rana luteiventris*) and the western toad (*Bufo boreas*). They no longer occur in habitats surrounding Utah Lake. The Columbia spotted frog still occurs in one isolated spring/wetland complex near Springville, Utah but western toad no longer occurs in Utah Valley. The native chorus frog (*Pseudacris triseriata*) is still abundant in habitats surrounding Utah Lake and throughout Utah Valley.

Four native mollusk species were historically found in wetland and spring habitats adjacent to Utah Lake. These species were: California floater *(Anodonta californiensis),* glossy valvata (*Valvata humeralis)*, desert valvata (*Valvata utahensis), and* Utah physa *(Physella utahensis).* The desert valvata is considered extirpated in Utah. The California floater, glossy valvata, and Utah physa have not been observed in or around Utah Lake for many years.

3.8 Threatened and Endangered Species

The Utah Lake ecosystem and surrounding area supports aquatic and terrestrial organisms that are designated threatened or endangered species by the federal government. Federally listed species that inhabit the lake environment and the surrounding ecosystem include: June sucker, Ute ladies' tresses (*Spiranthes diluvialis),* and y*ellow-billed cuckoo (Coccyzus americanus).*

June sucker: The June sucker is a lakesucker endemic to Utah Lake. It exists naturally only in Utah Lake and spawns naturally only in the Provo River. The June sucker was federally listed as an endangered species with critical habitat on April 30, 1986 (51 FR 10857). The listing was due to its localized distribution, failure to recruit new adult fish, and threats to its continued survival.

Predation and competition by nonnative fish have been identified as primary causes for decline of the June sucker and other native fish in Utah Lake (51 FR 10857). A risk assessment, based on four categories of effects (i.e., predation, competition, abundance, habitat destruction), ranked common carp as the nonnative species with the highest potential for conflict with June sucker recovery (SWCA 2002). The carp's life history not only reduces habitat complexity that leads to a simplified ecosystem, they also compete with young and juvenile June sucker for food in sheltered habitats (Petersen 1996), and often ingest eggs and larvae of fish species as they forage (Taylor et al. 1984; Aquatic Nuisance Species Task Force [ANSTF] 1994; Tyus and Saunders 1996).

Common carp introductions have been blamed for significantly reduced aquatic vegetation in Utah Lake, which is critical as cover from predators for early life stages of June sucker (Petersen 1996; Crowl et al. 1998). Adult June sucker have persisted in Utah Lake, despite the presence of nonnative carp, because they are a long-lived species and are not direct competitors with carp for food, space or other habitat within the lake. However, the documented damage of carp to the lake environment generally is detrimental to June sucker in many ways discussed above and an impediment to recovery of the species. Minimizing the impacts of non-native species in Utah Lake is a key task in the approved Recovery Plan for the June sucker (FWS 1999). Currently, there is no documented recruitment of June sucker from the vulnerable larval to the young-of-year stage within Utah Lake.

Ute ladies' tresses: Ute ladies'-tresses were listed as threatened on January 17, 1992 (57 FR 2053). Ute ladies'-tresses are a perennial orchid found along riparian edges, gravel bars, old oxbows and moist to wet meadows along perennial freshwater streams and springs at elevations ranging from approximately 4,300 to 7,000 feet (USFWS 1992; Stone 1993). It is an early to mid successional species that is well adapted to low floodplain terraces along alluvial streams where scouring and sediment deposition are natural processes. It has been found in irrigated and sub-irrigated pastures that are mowed or moderately grazed. In general, the orchid occurs in relatively open grass and forb dominated habitats, and seems intolerant of dense shade. The plants bloom from late July through August (sometimes September), setting seed in the early fall. A colony is defined as any location where flowering plants have been found in a similarly delineated habitat on that geomorphic surface. Therefore, a colony may be comprised of one or more individuals on a sandbar (large or small) or on a large flood plain delineated by topographical changes in slope or elevation. Ute ladies' tresses are known to occur in areas around Utah Lake and its tributaries, with populations documented in areas near Springville and American Fork cities.

Yellow-billed cuckoo: The western subspecies of the yellow-billed cuckoo was listed as a candidate species in the western United States in 2001 (USFWS 2003). These cuckoos are closely associated with riparian areas containing tall cottonwood trees (*Populus spp.*) and an abundant sub-canopy or shrub layer at elevations between 2,500 and 6,000 feet mean sea level (MSL) in Utah. The cuckoo stays in the dense canopy of trees or tangles of undergrowth. They are one of the latest migrant species to nest in the state, arriving in late May or early June and breeding through July. Southward migration usually begins in late August or early September. Observations of cuckoos near Utah Lake include areas along the Provo River, the Brigham Young University Agricultural Station north of Salem City, and near Springville City.

3.9 Recreation

Utah Lake supports nonnative sport fish such as channel catfish, walleye, white bass, black bass and several different species of panfish. Utah Lake is Utah's largest freshwater lake and pressure on the lake as a fishing destination has decreased over the past ten years (JSRIP 2007). Angling hours on the lake declined 56% from 134,958 angler hours in 1995 to 59,237 angler hours in 2005 (UDWR 2007). Catch rates also decreased. In 1995, the catch rate was 0.48 fish per hour as compared to 0.31 fish per hour in 2005. The predominance of common carp and their associated impacts have been implicated as a cause for the reduced quality of fishing opportunities on the lake. Radant and Sakaguchi (1981) characterized the fishery resources of Utah Lake as “not fully utilized”, but contended that fishing opportunities could be improved through management (increasing white bass growth, increasing abundance of other game fish, reducing carp abundance). Due to the close proximity to urban centers, they predicted, fishery improvements could make Utah Lake one of the more important fishing destinations in the state. Increased water quality and habitat may increase the recreational appeal of the largest freshwater lake in Utah.

The main recreation access to Utah Lake is Utah Lake State Park at the mouth of the Provo River (Draft RMP Utah Lake State Park 2001). Utah Lake State Park provides public access on the east shore for power boating, sailing, canoeing or kayaking, and also provides camping and day-use facilities. Featured at the state park is a 30-acre marina. This marina contains 78 boat slips, four paved boat ramps, a constructed beach, boat storage, office facilities, and a 73-unit campground. Additional public access is located in Lindon, American Fork, Saratoga Springs, and Lincoln Beach. Each of these locations has a boat harbor and park but is smaller than Utah Lake State Park. Utah Lake gets relatively light use from boaters compared to other reservoirs in the area because of the lake’s shallowness and because of perceived water quality issues.

3.10 Cultural Resources

Utah Valley was used historically by Native Americans and also by early Anglo settlers. Cultural resource studies have identified that humans inhabited the Utah Valley at least 6,000 years prior to the arrival of European settlers (Janetski 1990). Surveys conducted

by an archaeology team from Brigham Young University summarized and documented an abundance of cultural sites along the shore of Utah Lake (Janetski 2004), especially along the northern, eastern, and southern shorelines. Sites have also been located below the Utah Lake water surface compromise elevation. The presence of multiple cultural sites combined with reports of several Native American groups using the fishery resource of Utah Lake and its tributaries, has led to the belief that Utah Lake played a major role in the lives and cultural of historic Utah Valley inhabitants (Carter 1969, Janetski 1990).

Permanent European settlements near Utah Lake began with the arrival of Mormon pioneers in 1847. Several historic sites constructed prior to 1940 are located near Utah Lake. These sites include the Provo Boat Harbor, developed in the 1920's, Geneva Resort at the present day Lindon Boat Harbor, and Fort Utah, one of the earliest Anglo settlements in Utah Valley, located approximately three miles upstream from the mouth of the Provo River.

3.11 Economics

Water bodies of degraded quality often support less recreational activity and produce fewer economic benefits than those of greater quality (O'Riordan 1999). This is likely the case for Utah Lake as investigations into recreational uses have identified the lake as an underutilized resource (Radant and Sakaguchi 1981; Draft RMP Utah Lake State Park 2001).

Utah Lake has supported commercial fisheries for over a century. Commercial fishing harvests over the past few decades, primarily for common carp, have been as high as 2.5 million pounds annually dependent upon the demand. The Utah Lake carp supply has always exceeded the demand.

The sale of fishing licenses generates approximately $11 million per year in revenue for the State of Utah. Recreational angling on Utah Lake is low compared to other nearby waters in spite of its location near the heavily populated Wasatch Front (UDWR 2007). The predominance of carp in Utah Lake and impacts associated with them have been implicated in low use by recreational anglers' rates and the associated economic benefits.

3.12 Environmental Justice

Presidential Executive Order 12898 (EO 12989), regarding "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires that each federal agency identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its program, policies, and activities on minority populations and low income populations. According to information provided by the U.S. Census Bureau (2007), the ethnic diversity of Utah County is 93.2 percent White, 1.2 percent Black, 1.3 percent American Indian or Alaska Native, 2.0

percent Asian, 0.7 percent Native Hawaiian and Other Pacific Islander, 1.6 percent two or more races, and 11.6 percent Hispanic or Latino.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

This chapter describes anticipated potential effects to the existing environmental resource conditions described in Chapter 3. In each section of this chapter, anticipated environmental effects are described for the No-Action alternative and for the Proposed Action Alternative, as these alternatives were described in Chapter 2.

Although this section describes "anticipated" environmental effects, biomanipulation, in the form of common carp removal, represents an ecosystem-level manipulation. Common carp are often referred to as "environmental engineers" and can be considered an ecosystem driver in Utah Lake. However, precisely predicting the response of the ecosystem to removal of common carp can be problematic.

In addition to common carp, nutrient loading and lake level management are the primary ecological drivers of the system. Chances of improving a lake system are often better if several restoration measures are combined. Based on examples of similar efforts (see Scheffer 1998), nutrient control in combination with carp removal and control would be a preferred long-term strategy for restoring the ecosystem upon which June sucker depend, and would improve the chances of transitioning Utah Lake into a clear water state where primary productivity is driven by aquatic plants. An objective of the recently adopted Utah Lake Master Plan, the guiding document of the Utah Lake Commission, a collaboration of local municipalities, Utah County, and resource management agencies, is that the "Commission will encourage the study of phosphorus effects on beneficial uses of Utah Lake and other studies that may provide information on how to protect and improve Utah Lake water quality." At this time, due to concerns with cost and uncertainties of effectiveness, nutrient control of waste water treatment plants is not on the foreseeable horizon. Since 76.5% of the total phosphorus load to the lake is from point sources (i.e. waster water treatment plants) control of the majority of the nutrient loading to Utah Lake, although expensive, is feasible. The combination of nutrient control and biomanipulation can be a good way to restore a turbid shallow lake where each of these measures separately may be unsuccessful (Sheffer 1998).

The anticipated environmental effects described in this section are based on information available in the scientific literature pertaining to biomanipulation of shallow lake ecosystems as a means to shift those systems into a clear water state where primary productivity is driven by rooted aquatic plants. Even if carp removal does not result in the restoration of clear water and rooted aquatic plants, because of their sheer dominance of the Utah Lake system, removing common carp will provide ecological space for other fish species and is essential for the recovery of June sucker. The removal of common carp is a prerequisite to improved water clarity and conditions ultimately necessary for aquatic vegetation to develop.

4.1 Water Quality and Supply

No-Action Alternative

No additional environmental consequences to water resources, including water quality and quantity, would occur under this alternative. Water quality would remain in a degraded state with high turbidity and high levels of internal nutrient loading. There would be no opportunity to improve nutrient loading issues in Utah Lake by means of reduction of the large biomass of carp, as suggested by the UDWQ TMDL study (UDWQ 2007).

Alternative A: Preferred Alternative (Mechanical Removal of Common Carp)

The mechanical removal of common carp from Utah Lake would have no impact on water supply or quantity. Water quality, however, should improve as a result of significantly reducing the carp population.

Suspended sediments: On average, common carp resuspend 662 kg/ha dry sediment for each 100 kg/ha of carp, or 6.6 times their wet weight biomass in dry sediments each day (Swirepik 1999). Using this ratio and based on a population estimate of 7.5 million adult carp with an average weight of 5.8 pounds (2.63 kg), a total of over 287 million pounds (130 million kg) of sediment is resuspended each day by carp in Utah Lake. Based on population estimates, carp densities in Utah Lake are about 505 kg/ha, and again using the ratio provided (in Swirepik 1999), a total of approximately 3,343 kg dry sediment per hectare is resuspended in Utah Lake each day.

Undoubtedly, the resuspension of bottom sediments by carp in Utah Lake is a significant contributing factor to elevated turbidity levels. Elevated turbidity levels in Utah Lake limit solar penetration through the water column. A reduction in turbidity levels as a result of the reduction of the common carp population, would allow for deeper solar penetration, which in turn, would allow for the establishment of rooted aquatic plants at greater depths. The habitat complexity provided by aquatic plants would benefit June sucker by providing cover to avoid predation. Reduced turbidity would markedly improve aesthetic qualities of Utah Lake, encourage recreation, and increase other public uses and generally increase public support for Utah Lake as a valuable public resource.

Internal nutrient loading: Common carp introductions have been blamed for loss of water clarity and biodiversity in many shallow lakes worldwide (Zambrano et al. 2001). Many studies have demonstrated immediate ecosystem responses to carp removal (e.g., Lougheed and Chow-Fraser 2001; Zambrano and Hinojosa 1999; Zambrano et al. 1999; Schrage and Downing 2004). Responses include improvements in water clarity, macrophyte re-growth, reestablishment of a large-bodied zooplankton community, and increases in benthic communities. “Because common carp excrete and defecate both nitrogen and phosphorus, they may stimulate phytoplankton growth under nitrogen or phosphorus limiting conditions. However, populations of common carp likely have

greater effects on phytoplankton biomass in high phosphorus systems relative to low phosphorus systems because their nitrogen excretion and defecation enhances the water column Nitrogen to Phosphorus ratio. Removal of common carp from systems with high concentrations of phosphorus may have a greater effect on water quality than removal of common carp from systems with low concentrations of phosphorus (Chumchal and Drenner 2004).

In Utah Lake, carp contribute to elevated nutrient levels by making sediment-bound nutrients available in the water column through their digestive activities and foraging behavior. A significant reduction in the carp population would reduce internal nutrient loading resulting from their digestive activities and foraging behavior.

Rooted aquatic plants: The interacting effects of lake level regulation, nutrient loading and foraging by carp have been demonstrated to significantly reduce or eliminate rooted aquatic vegetation in shallow lakes (Scheffer 1998). In Utah Lake, aquatic vegetation is believed to be critical as cover from predators for early life stages of June sucker (Petersen 1996; Crowl et al. 1998). Currently, Utah Lake is considered a hypereutrophic system with primary production dominated by algae. It is anticipated that implementation of the preferred alternative would reduce the common carp population in Utah Lake sufficiently to allow for the re-establishment of rooted aquatic plants. Rooted aquatic plants are important for a number of ecological reasons. In terms of water quality, rooted aquatic plants anchor bottom sediments thereby preventing sediment resuspension and reducing turbidity and nutrient availability in the water column. Aquatic plants provide habitat complexity and a predation refuge for zooplankton, which consume algae, thereby promoting water clarity. Rooted aquatic plants also compete directly with algae for nutrients and sunlight, and their presence provides a buffer against algal blooms. Through shading, rooted aquatic plants limit the potential for solar-induced warming. There is also indication that some rooted aquatic plants exhibit allelopathic tendencies, in that they produce and secrete chemicals into the surrounding water column that actually inhibit the growth of algae.

The reduction and maintenance of the carp population at reduced levels is necessary to provide conditions suitable for the re-establishment of rooted aquatic plants in Utah Lake and move the lake towards a clear water state with a rich array of rooted aquatic vegetation. Once established, water quality would benefit as rooted aquatic plants would contribute to a reduction in suspended sediments and nutrient availability in the water column, and provide shading which would reduce water temperature (Scheffer 1998, Miller and Crowl 2006).

4.2 Vegetation

No Action Alternative

No impacts to current aquatic or terrestrial vegetation would occur under this alternative. Utah Lake would remain in a turbid ecological state devoid of habitat structure with primary productivity dominated by algae.

Alternative A: Preferred Alternative (Mechanical Removal of Common Carp)

Aquatic Vegetation

Rooted aquatic vegetation should benefit from implementation of the preferred alternative.

Shallow lakes can exhibit two stable ecological states, one where primary productivity is driven by aquatic plants and one where algae is the dominant primary producer (Scheffer 1998). Historically, Utah Lake was described as having large aquatic plant beds throughout the lake. Currently, the lake is in the algae-driven stable state with algal densities and suspended solids inhibiting the growth of aquatic plants through the effects of shading (Crowl 2003). Shallow lakes can be restored to an ecological state where primary productivity is driven by rooted aquatic plants. Reducing the abundance of bottom-feeding fish (i.e. common carp in Utah Lake) is necessary for the restoration of rooted aquatic vegetation.

It is anticipated that the rooted aquatic vegetation community in Utah Lake would respond positively to carp removal based on the following:

- With the removal of 75% of the common carp population and subsequent reduction of the direct disturbance to bottom sediments caused by the foraging and spawning behavior of carp, aquatic vegetation would be able to take root and grow;
- Reduced carp-induced suspension of sediments should significantly reduce turbidity allowing for solar penetration deeper into the water column and to a greater area of the lake bottom; and,
- Direct foraging on aquatic plants by carp would be reduced.

Depending on turbidity levels after carp removal, the shallow nature of Utah Lake would allow for light penetration to a significant portion of the lake bottom and the potential for establishment of a broad littoral zone with extensive beds of aquatic plants. It is anticipated that the aquatic plant community would include emergent, floating and submerged vegetation which would provide habitat structure and complexity for a number of taxa (i.e. zooplankton, aquatic plant-associated invertebrates, small fish, etc.) that the homogenous habitat state Utah Lake currently exhibits does not support.

Terrestrial Vegetation

No environmental consequences to terrestrial vegetation would occur under this alternative. Much of the proposed action would take place on Utah Lake with offloading of captured fish occurring at improved access points with established roads and facilities.

4.3 Soils

No Action Alternative

No environmental consequences or changes to soils would occur under this alternative.

Alternative A: Preferred Alternative (Mechanical Removal of Common Carp)

Implementation of the preferred alternative would have no effect on terrestrial soils. Disturbance of lake-bottom benthic soils as a result of carp foraging behavior would be significantly reduced.

4.4 Air Quality

No Action Alternative

No environmental consequences or changes to air quality would occur under this alternative.

Alternative A: Preferred Alternative (Mechanical Removal of Common Carp)

Implementation of the preferred alternative would have no effect on air quality.

4.5 Terrestrial Wildlife

No-Action Alternative

No impacts to or changes in riparian or wetland vegetation would occur under this alternative and therefore, no improvements in habitat for terrestrial sensitive species would occur.

Alternative A: Preferred Alternative (Mechanical Removal of Common Carp)

There are no expected direct effects of the mechanical removal of carp on terrestrial wildlife. However, the removal of common carp below 75% of its current population is expected to directly improve water quality, increase rooted aquatic vegetation, and change the lake from an algae-driven system to a system dominated by aquatic plants. A decrease in the carp population may help increase habitat diversity, productivity and

therefore, increase the use of Utah Lake by terrestrial wildlife. Wetland vegetation is expected to benefit from carp removal which, in turn, would benefit migratory bird species that use the Great Basin Flyway such as waterfowl, shorebirds, neotropical songbirds, and raptors by increasing food resources and providing habitat and refugia from predators. There are also sensitive populations of native mammals, reptiles, invertebrates, and plants found along the Utah Lake shoreline and its tributaries that could indirectly benefit from habitat improvements such as increased rooted emergent vegetation and improved water quality resulting from carp removal efforts.

4.6 Fish and Aquatic Wildlife

No Action Alternative

Under the No-Action alternative common carp would continue to form the dominant biomass in the lake. The carp population in Utah Lake would likely remain at present levels, neither growing nor decreasing. Research efforts by the JSRIP indicate that carp are at or possibly above carrying capacity in the lake at this time and would, therefore, not be expected to increase. The "carp-driven" ecological factors extant in Utah Lake would not likely change. We believe these include significant contributions to lake turbidity, nutrient loading (primarily phosphorus) in the water column and sediments, suppressed populations of rooted aquatic plant species, and reduced ecological diversity.

Alternative A: Preferred Alternative (Mechanical Removal of Common Carp)

By removing common carp, which currently represent over 90 percent of the fish biomass in Utah Lake, other populations of fish species within the system would respond directly by increasing numbers and biomass. Carp removal is expected to benefit other species of fish by improving water quality, increasing habitat, and improving habitat structure. Ultimately, a more balanced fish community and productive fish habitat should result from decreased carp numbers in Utah Lake. During carp removal there is the potential to capture other non-target fish species but measures would be taken to minimize capture of non-target species. Gear types would be used that minimize the capture of non-target species and areas where carp congregate would be targeted. In addition, commercial fishermen employed in the project and DWR observers aboard commercial boats would actively retrieve and return all non-target fish species to Utah Lake.

4.7 Threatened and Endangered Species

No Action Alternative

No environmental consequences to threatened or endangered species would occur under this alternative except to the endangered June sucker. June sucker in Utah Lake would continue to experience recruitment failure and full recovery of the species would be unachievable.

Alternative A: Preferred Alternative (Mechanical Removal of Common Carp)

The Preferred Alternative would implement an important action in the approved Recovery Plan for the June sucker, that of minimizing the impacts resulting from non-native fish species in Utah Lake. The removal of common carp, which currently dominate the Utah Lake fish community, would increase resource availability and decrease competition with and predation on June sucker life stages. June sucker may experience increased growth rates and survival with a reduction in carp biomass. Implementation of the preferred alternative is expected to benefit the June sucker by increasing available habitat in Utah Lake. Common carp have been identified as the primary nonnative fish threat to June sucker. The reduction in the carp population is expected to decrease substrate disturbance leading to increased rooted aquatic vegetation, which would provide critical cover from predators for early life stages of June sucker (Petersen 1996; Crowl et al. 1998). Directly, the June sucker may be affected, but not adversely affected by carp removal if captured as by-catch during carp removal. Pilot studies of carp removal conducted on Utah Lake indicate very few June sucker were captured as incidental by-catch. Those captured were returned to Utah Lake with only one mortality over a 6-month pilot period. Gear types specifically designed to minimize the capture of June sucker would be used and, for those that may be captured, crews and observers would remove June suckers from the nets and return to the lake as quickly as possible. Observers on each boat would report on incidental take of June sucker to ensure compliance with all measures to reduce direct impacts. No direct effects on the yellow-billed cuckoo or the Ute ladies' tresses would occur because their habitats would not be affected by the Preferred Alternative. These species may respond positively to the increased habitat diversity and increased productivity that is predicted to occur after a 75% reduction in the carp population.

In conclusion, the Preferred Alternative would have no effect on Ute ladies' tresses or yellow billed cuckoo. The Preferred Alternative may affect but would not adversely affect the endangered June sucker. The Service will be conducting an internal consultation as required pursuant to Section 7 of the Federal Endangered Species Act.

4.8 Recreation

No Action Alternative

No impacts to current levels of recreation would occur under this alternative. We also believe the abundance of carp led to a public perception of Utah Lake as polluted, dominated by trash fish and generally not suitable for public use.

Alternative A: Preferred Alternative (Mechanical Removal of Common Carp)

The direct impact of mechanical carp removal on recreation would be minimal. There would be an increase in the number and movement of fishing vessels on the lake during the late summer and early fall. There would also be increased activity at boat ramps where off-loading would occur. The public using Utah Lake would see and detect the odor of carp removal efforts during the intensive fishing periods. We would make every effort to plan fishing and off-loading efforts to minimize impacts on lake recreation, responding to suggestions and complaints to improve implementation.

Indirectly, carp removal is expected to increase water clarity, increase fish catch rates for recreational anglers, and improve water quality which we believe would increase the quantity and quality of all recreation on the lake over time.

4.9 Cultural Resources

No-Action Alternative

No impacts to cultural resources would occur under this alternative.

Alternative A: Preferred Alternative (Mechanical Removal of Common Carp)

No known cultural resources would be impacted by this preferred alternative. Potential for impacting cultural resources may increase if processing facilities are constructed. Should construction of a processing facility be proposed, associated impacts to cultural resources would be evaluated in an addendum to this environmental assessment. Furthermore, archaeological clearance will be obtained prior to the construction of any facilities.

4.10 Economics

No Action Alternative

No impacts or changes to current economic conditions would occur under this alternative.

Alternative A: Preferred Alternative (Mechanical Removal of Common Carp)

Water bodies of degraded quality often support less recreational and commercial activity and produce fewer economic benefits than those of greater quality (O'Riordan 1999). It is anticipated that improvements to water quality associated with carp removal (i.e. increased water clarity, reduced internal nutrient loading) would attract more use of the lake which, in turn, would generate additional economic potential, at least initially through greater recreational use of the lake.

Sport fish populations are expected to respond positively to carp removal. Increased productivity of fish habitat, increased prey populations, and reduced competition from carp, is expected to increase numbers and size of desirable sport fish. Improved catch rates and water quality would make Utah Lake more desirable to recreational anglers which could result in an increase in fishing license sales and associated revenues generated from the angling public.

If a suitable use for harvested carp is employed, small economic benefits would be realized by local communities.

4.11 Cumulative Impacts

The Council on Environmental Quality defines cumulative impacts as the impact on the environment resulting from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time (40 CFR Section 1508.7). Cumulative impacts can be concisely defined as the total effects of the multiple land uses and development, including their interrelationships, on the environment. The area around Utah Lake continues to see additional growth and development with much of the growth occurring in the Saratoga Springs area west of Utah Lake. Some of this growth has resulted in the conversion of agricultural land to subdivisions and housing developments and has also prompted transportation projects that will result in more roads being constructed in and around the project area.

Utah Lake and the surrounding area have changed dramatically over the past 100 years, due to increased urbanization and changes in agricultural impacts. Some impacts have been detrimental, including increased nutrient loading to Utah Lake, loss of wildlife and aquatic habitats, increased soil compaction, and loss of habitats around the lake due to urbanization and increased recreational use of facilities. Water

development within the watershed has also resulted in changes in water quality and supply and the fluctuation of Utah Lake levels.

However, the recent past has seen a general trend towards correction of past problems and marked efforts to restore and improve Utah Lake. The Preferred Alternative would contribute greatly to ongoing restoration efforts. Chief among these has been the elimination of untreated sewage discharges to the lake and the advances of modern treatment technologies which are standard in all urban communities around Utah Lake. The 2007 Utah Division of Water Quality "TMDL" study was an effort to identify and address all remaining water quality problems affecting Utah Lake, primarily phosphorus and salinity (UDWQ 2007).

The shift from agricultural to urban uses of Utah Lake water, primarily in the Salt Lake City area where most Utah Lake water is used, will result in reduced lake level fluctuations and reduced saline irrigation return flows to the lake. The completion of the Central Utah Project will further alter uses of Utah Lake water in a manner that will dampen lake fluctuations and may improve lake water quality (CUWCD 2004). As discussed above, these actions should assist in improving the Utah Lake environment generally and June sucker recovery in particular.

It is unlikely that UDWR would approve the introduction of any additional non-native fish species into Utah Lake, a historic practice we now recognize as harmful to the Utah Lake ecosystem. Moreover, UDWR has approved and supported the concept of removal of non-native carp under the JSRIP.

Cumulatively these past and future trends are beneficial for Utah Lake and will contribute to June sucker recovery. Carp removal would not impede or be contrary to any of these trends and, in fact, should contribute in a positive manner.

4.12 Environmental Justice

Executive Order 12898 requires all Federal agencies to take actions, to the extent practical and permitted by law, to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human effects of its programs, policies, and activities on minority populations and low income populations in the United States and its possessions. The project would not result in disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.

CHAPTER 5: AGENCIES AND PERSONS CONSULTED

List of Preparers:

Betsy Herrmann, U. S. Fish and Wildlife Service, Fish and Wildlife Biologist
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Agencies Consulted

In preparing this environmental assessment the Service and the JSRIP consulted with the following agencies:

- Bureau of Reclamation
- Department of Interior CUP Completion Act Office
- Utah Department of Natural Resources
- Utah Department of Environmental Quality
- Central Utah Water Conservancy District
- Provo River Water Users Association
- Utah Reclamation Mitigation and Conservation Commission
- Jordan Valley Water Conservancy District
- Utah Lake Commission
- Utah Division of Wildlife Resources

A copy of this draft environmental assessment will be provided to each of the above agencies.

CHAPTER 6: LITERATURE CITED

Aquatic Nuisance Species Task Force (ANSTF). 1994. Findings, conclusions, and recommendations of the international introductions policy review: Report to Congress. Aquatic Nuisance Species Task Force, U.S. Fish and Wildlife Service, Washington, D.C.

Carter, D. 1969. A history of commercial fishing on Utah Lake. Master's Thesis. Brigham Young University, Provo, UT. 142 pp.

Central Utah Water Conservancy District (CUWCD). 2007. Utah Lake Water Fluctuation Study. Central Utah Water Conservancy District. Orem, Utah.

Central Utah Water Conservancy District (CUWCD). 2004. Utah Lake Drainage Basin Water Delivery System Final Environmental Impact Statement. Orem, UT. September 2004.

Coombs, R.E. 1970. Aquatic and semi-aquatic plant communities of Utah Lake. Unpublished dissertation, Brigham Young University.

Crowl, T.A., H.M. Thomas, and D. Vinson. 1998. June sucker and Utah Lake fisheries management studies: 1995–1997. Final report submitted to Utah Division of Wildlife Resources, Salt Lake City, Utah and Central Utah Commission, Salt Lake City, UT. 112 pp.

Fuhriman, D.K., L.B. Merritt, A.W. Miller, and H.S. Stock. 1981. Hydrology and water quality of Utah Lake. Great Basin Naturalist Memoirs, No. 5: Utah Lake Monograph. Provo, Ut, Brigham Young University. 169 pp.

Janetski, J.C. 1990. Utah Lake: Its Role in the Prehistory of Utah Valley. Utah Historical Quarterly 58(1):5-31.

Janetski, J.C. 2004 Archaeological Survey and Limited Excavations in Utah Valley. Museum of Peoples and Cultures Technical Series 04-19. Brigham Young University, Provo, Utah.

June Sucker Recovery Implementation Program (JSRIP). 2007. Program accomplishments calendar year 2006. Salt Lake City, UT.

Lougheed, V.L., and P. Chow-Fraser. 2001. Spatial variability in the response of lower trophic levels after carp exclusion from a freshwater marsh. Journal of Aquatic Ecosystem Stress and Recovery 9:21–34.

Miller, S.A. and T.A. Crowl. 2006. Effects of common carp (*Cyprinus carpio*) on macrophytes and invertebrate communities in a shallow lake. Freshwater Biology 51(1):85-94.

O'Riordan, T. 1999. Economic challenges for lake management. Hydrobiologia 395/396: 13-18.

Petersen, M. 1996. The effects of prey growth, physical structure, and piscivore electivity on the relative prey vulnerability of gizzard shad (*Dorosoma cepedianum*) and June sucker (*Chasmistes liorus*). Master of Science Thesis. Utah State University. Logan, UT.

Popov, B.H. 1949. The introduced fishes, game birds, and game and fur-bearing mammals of Utah. M.S. Thesis. Utah State University, Logan, UT.

Pritchett, C.L., H. H Frost, and W. W. Tanner. Terrestrial vertebrates in the environ of Utah Lake. *In* Utah Lake Memoirs. BYU

Radant, R.D., and D.K. Sakaguchi. 1981. Utah Lake fisheries inventory. U.S. Bureau of Reclamation Contract 8-07-40-50634. Utah Division of Wildlife Resources. Salt Lake City, UT. 244 pp.

Scheffer, M. 1998. Ecology of Shallow Lakes. Kluwer Academic Publishers.

Schrage, L.J., and J.A. Downing. 2004. Pathways of increased water clarity after fish removal from Ventura Marsh; a shallow, eutrophic wetland. Hydrobiologia 511:215–231.

Stone, R. D. 1993. Final report for 1992 challenge cost share project, Uinta and Wasatch-Cache National Forests. Target species: Ute ladies'-tresses *(Spiranthes diluvialis Sheviak)*. Salt Lake City, Utah: Utah Natural Heritage Program, Utah Department of Natural Resources.

SWCA. 2002. Nonnative Fish Control Feasibility Study to Benefit June Sucker in Utah Lake. Final Report to the June Sucker Recovery Implementation Program. SWCA Environmental Consultants. Albuquerque, New Mexico.

SWCA. 2006. Final Report: Population Assessment and Mechanical Control of Common Carp (*Cyprinus* carpio) in Utah Lake. Final Report to the June Sucker Recovery Implementation Program. SWCA Environmental Consultants. Albuquerque, New Mexico.

Taylor, J.N., W.R. Courtenay, Jr., and J.A. McCann. 1984. Known impacts of exotic fishes in the continental United States. Pages 323-373 *in* W.R. Courtenay, Jr., and J.R. Stauffor, Jr. Distribution, biology, and management of exotic fishes. John Hopkins University Press, Baltimore, MD.

Thompson, C.W., and D.E. Wiley. 1998. 1997 Utah Lake fish population monitoring report. Utah Division of Wildlife Resources. Springville, UT.

Tyus, H.M., and J.F. Saunders III. 1996. Nonnative fishes in the Upper Colorado River

Basin and a strategic plan for their control. Final Report for Cooperative Agreement No. 14-48-0006-95-923 with U.S. Fish and Wildlife Service. Denver, CO.

U.S. Fish and Wildlife Service (USFWS). 1992. *Endangered and threatened wildlife and plants*. Final rule to list the plant Spiranthes diluvialis (Ute ladies'-tresses) as a threatened species. Federal Register 57 (12): 2048- 2054.

U.S. Fish and Wildlife Service (USFWS). 1999. June Sucker (*Chasmistes liorus*) Recovery Plan. U.S. Fish and Wildlife Service. Denver, Colorado.

U.S. Fish and Wildlife Service (USFWS). 2003. Endangered and Threatened Wildlife and Plants; Notice of Remanded Determination of Status for the Contiguous United States Distinct Population Segment of the Canada Lynx; Clarification of Findings; Final Rule, 50 CFR 17. Federal Register Volume 68, Number 128, July 3, 2003. Pages 40075 to 40101.

Utah Department of Natural Resources (DNR). 2001. Draft RMP Utah Lake State Park.

Utah Division of Air Quality. 2006. State of Utah National Ambient Air Quality Standards Areas of Non-Attainment and Maintenance.

Utah Division of Solid and Hazardous Waste. 2009. 2009 Utah Landfill Facility Inventory.

Utah Division of Water Quality (UDWQ). 2007. Utah Lake TMDL: Pollution Loading Assessment and Designated Beneficial Use Impairment Assessment. Utah Division of Water Quality. Salt Lake City, Utah.

Utah Division of Wildlife Resources (UDWR). 2005. Utah Comprehensive Wildlife Conservation Strategy. Utah Division of Wildlife Resources. Salt Lake City, Utah.

Utah Lake Research Team, Eyring Institute, Inc. and Brigham Young University. 1982. WHAB phase 1 summary: Water quality, hydrology and aquatic biology of Utah Lake.

Wakefield, J.H. 1933. A study of the plant ecology of Salt Lake and Utah Valley before the Mormon immigration. Unpublished thesis. Brigham Young University. 54 pp.

White, J., and B. Dabb. 1970. Fish population studies, Utah Lake. Division of Wildlife Resources. Springville, UT. 45 pp.

Zambrano, L., and D. Hinojosa. 1999. Direct and indirect effects of carp (*Cyprinus carpio* L.) on macrophyte and benthic communities in experimental shallow ponds in central Mexico. Hydrobiologia 408/409:131–138.

Zambrano, L., M.R. Perrow, C. Macías-García, and V. Aguirre-Hildalgo. 2001. Impact of

introduced carp (*Cyprinus carpio*) in subtropical shallow ponds.

APPENDIX A: SUMMARY OF PUBLIC COMMENTS ON THE DRAFT ENVIRONMENTAL ASSESSMENT AND ASSOICATED RESPONSES

Summary of Public Comments on the Draft Environmental Assessment and Agency Responses

The Draft Environmental Assessment was made available to the public on November 18, 2009. A public comment period extended from the release date until December 17, 2009. A copy of all written public comments received by letter or e-mail are included as part of this Appendix. The following table summarizes how issues identified in public comments have been addressed in the preparation of the Final EA document.

Comment Source	Comment/Issue	Response	Text References Final EA
Letter from Mr. Joel Janetski dated December 8, 2009	"Secondly, I found the section on cultural resources woefully inadequate. Although Robert Carter's contributions to understanding and documenting the recent history of human use of Utah Lake is important and considerable, his work does not delve into the pre-European history in any detail."	The cultural resource section of Chapter three has been updated to include information on pre-European inhabitants of Utah Valley and their use of Utah Lake.	See Section 3.10.
	"That said, I tend to agree with your finding of no significant impact on cultural resources with the mechanical removal of carp alternative unless processing facilities are constructed on or near the lake shore. This would include Bird Island. Any such construction should consider the possibility of damage to archaeological sites, and an archaeological clearance should be completed."	The cultural resource section of Chapter four has been updated to include the need for obtaining archaeological clearance prior to the construction of processing facilities near the shore of Utah Lake.	See Section 4.9.
Letter from Utah Waters, Salt Lake County Fish and Game, Sierra Club Southwest Waters Action Team, and Great Salt Lakekeeper dated December 17, 2009.	"How does the recovery program intend to deal with the explosion of a new population of smaller carp and their almost certain additional recruitment into the adult population?" "There are simply too many unanswered questions about how carp and all of the many other exotic and native Utah Lake fishes will respond to removal efforts, including the "boom" of younger carp and solutions to the problems this boom will undoubtedly cause for June suckers of all age classes."	The possible compensatory response of the Utah Lake common carp population to removal efforts was analyzed as part of the research into the feasibility of mechanical control of common carp (SWCA 2006). That research identified the removal goal of five million pounds per year for five years to achieve the 75% reduction in overall population size. That research also identified a compensatory response of a 1-3% increase in survival as being reasonable for Utah Lake common carp. With such increases,	See Sections 2.2 and 4.6.

		maintaining a 75% reduction in population size would require 13 to 63 days of harvest per year. Ongoing research on the Utah Lake food-web has indicated that removal of common carp will result in increases in several other fish species, including June sucker and white bass. That research does not indicate a large compensatory response by common carp to be likely, with carp not recovering to pre-removal levels (Kevin Landom Utah State University, personal communication). Research on other systems has documented a lack of compensatory response from common carp following removal efforts (Bajer and Sorenson 2009). This research has indicated that without a reduction in the other piscivorous species carp have been unable to rebound from the effects of large scale removal. As part of the proposed action, fish community monitoring efforts with be conducted to provide information on the response of all fish species. As long as monitoring is sufficient to detect population changes, adaptations to the removal efforts can be made. The ultimate response of Utah Lake common carp to large scale removal is unknown. Based on research efforts and similar efforts in other systems, it will be feasible to overcome any compensatory response of common carp through increased removal efforts or other means.	
	"Increased Predation on June Sucker"	Research does support population increases for some	See Section 4.2.

	"If competition with carp is reduced, other predator populations are sure to respond with disproportionate predation on young June suckers because suckers possess a more fusiform body shape, lack fin spines, and have smaller scales."	piscivorous species in response to large scale carp removal and it is possible that these increases will result in consumption of June sucker. Research also supports an increase in submerged aquatic vegetation as a result of carp removal (Miller and Crowl 2006). This increased vegetation can provide the refuge habitat that is currently lacking for June sucker to escape predation. The increased vegetation, combined with JSRIP efforts to improve near tributary habitats, will allow June sucker to overcome the potential for increased predation. June sucker evolved in the face of predation and with refuge habitat available the population can increase despite the threat of predation.	
	"Without such a plan, the environmental community fears that the Program will not be able to adapt to the rapid changes in fish populations and their sizes, predation rates, and intra- and inter-specific competition that will impact the success both of stocking and of anticipated natural reproduction. The Program is currently using only one commercial fisherman and his only current fishing method, seining, is not adapted to the high levels where carp can penetrate heavy cover along the shorelines. As a result, most spawning adult carp are essentially out of reach for long periods of the year. Although there are a variety of harvesting techniques, few of them have been investigated as they should have been through the development of a carp management plan." "There has been no progress on the development of a Carp Management Plan to guide any adaptive management as removal efforts confront the unavoidable	Research supporting the mechanical removal of common carp has indicated an average catchability of 0.5 for common carp through boat or purse seining (SWCA 2006). Research into other potential removal methods on Utah Lake, including trapping, have not resulted in catch rates sufficient to reach necessary removal goals. Information from other carp removal efforts has also supported seining as a principle removal method. A carp management plan has been compiled, but remains in draft form. The completion of such a plan is not necessary for an adaptive management approach to continue. The JSRIP will continue to research potential carp removal strategies and allow for the implementation of new methods should effective options become available.	See Section 2.2.

	challenges of changing weather patterns, changing fish populations, and diminishing returns of carp removal."		
	"The environmental community has gone on record for years to recommend that efforts to restore natural water level fluctuations would go farther to restoring aquatic vegetation and improving water quality than carp removal." "There has been little progress in studies demonstrating that current artificial water management has not been the main cause for the historic declines in the lake's vegetation, undermining faith in the long term success of the carp removal option. "There has been no progress on studies examining any potential to artificially manage lake water levels to enhance carp removal efforts, especially as carp removal efforts near completion when unfortunately wet weather patterns and resulting higher water levels could undermine the entire removal effort." "Without the ability to drop water levels to enhance carp removal, especially as the Program nears success when diminishing returns challenge removal efforts, it is possible that all previous carp removal efforts will be wasted." "There has been no progress on studies examining the potential to reduce the rates of water fluctuation caused by management of the lake as a water storage reservoir, which has been destructive to the aquatic vegetation that is so valuable to the lake's entire ecosystem and even to the improvements in water quality for downstream water users." "We believe that delaying any such effort until weather conditions are	An analysis of Utah Lake water level fluctuations was conducted previously to identify how water levels fluctuated historically and to estimate future fluctuations (CUWCD 2007). The analysis identified a pre-water development fluctuation of 2.1 feet annually, while under future conditions the annual fluctuation is 2.4 feet. Over the past 50 years the water level has fluctuated an average of 3.5 feet per year. The reduction in fluctuation rates in future years is due to reduced demands for Utah Lake water as water rights are exchanged upstream and held in the lake to improve Central Utah Project operations. These changes are currently being implemented and resulting in reduced fluctuations in Utah Lake water levels. The study (CUWCD 2007) also investigated additional options for further stabilization of Utah Lake. These options are difficult due to environmental, political, legal, and economic feasibility. Acquiring 50,000 acre feet of water would allow further stabilization of the lake, but at an average cost of $2,000 an acre foot, such a purchase would cost $100 million. Carp removal efforts may also lead to a reduction of turbidity in some areas of Utah Lake. This reduction in turbidity would allow increased solar penetration that would provide the opportunity for rooted plant establishment beyond the anticipated fluctuation level.	See Sections 2.3 and 4.1.

	more favorable will allow a much faster and efficient removal rate required to accomplish the stated carp removal goals."	The management of Utah Lake water levels is tied to several legal agreements and founded on State of Utah water rights law. The acquisition of water to allow for manipulation of water levels presents a daunting financial challenge. The effect of high lake levels on carp catchability could be overcome with increases in the number of fishing crews. While such an increase would result in higher costs, the costs would be less than those necessary for acquiring enough water to lower the level of Utah Lake. Implementing carp removal at lower lake levels would likely result in increased carp catchability. However, timing removal efforts to coincide with unpredictable weather events, such as a drought cycle, is beyond the Service's capabilities.	
	"The most overlooked, rational alternative to carp removal is the No-Action Alternative" "With increasing numbers of suckers comes increasing rates of interrupted energy flow to already struggling common carp populations, leading to an increasing decline in the general health of carp, diminishing reproductive success, and ultimately, fewer and fewer year classes of carp recruiting into adulthood." We believe the most important, major alternative for NEPA consideration, in the absence of more fully developed alternatives not currently under consideration, is the "No Action Alternative", as stated above.	We do not have evidence that June sucker are capable of out competing common carp. In recent years, partners to the JSRIP have made improvements to hatchery and grow out facilities to allow the stocking of 30,000 to 60,000 age-1 June sucker per year. These improvements have come at an expense in excess of $8 million. Research on Utah Lake common carp has indicated a population size of approximately 7.5 million adult fish. Even if a competitive advantage did exist, given the vast differences in population sizes, it would not be feasible to produce enough June sucker to cause a decline in the common carp population.	See Section 2.2.
	"There is little, if any, actually proof that carp were or are currently responsible for all of the declines	While it is likely that multiple factors have contributed to the decline of aquatic vegetation in	See Chapter 4 introduction and Section

	in aquatic vegetation in the lake in the first place, evidenced by the fact that large populations of even larger carp can be found living in concert with healthy stands of emergent aquatic vegetation in many other shallow waters found at the same general elevation in the area."	Utah Lake, research has indicated that the exclusion of common carp from specific areas of Utah Lake does result in increases in the growth of submerged aquatic vegetation (Miller and Crowl 2006).	4.2.
	"Program participants have not demonstrated adequate recent support for the prevention of exotic zebra and quagga mussel's introduction into the lake and entire drainage, a development that would change the entire ecosystem, and even the need to do carp removal at all!"	Preventing the introduction of dreissenid mussel species to the Utah Lake drainage is outside the scope of the proposed project. The comment that JSRIP participants have not supported recent prevention efforts is unfounded. Participants to the JSRIP have made significant contributions to the prevention of invasive mussel species. The Central Utah Water Conservancy District has contributed over $150,000 over the past two years to prevention efforts. The JSRIP funded an extra mussel inspector for Utah Lake last year and has worked with the Bureau of Reclamation to fund similar work in 2010, a contribution that will be above the Bureau's usual contribution to the JSRIP. In addition the State of Utah through its Department of Natural Resources has contributed significantly by initiating the dreissenid mussel interdiction program and securing over a million dollars to conduct prevention efforts.	See Section 1.3.
	"We believe that the Federal Government requires a more prudent approach, with higher levels of public involvement, thus allowing the public to catch up with what is NOT yet known about carp removal, as previously expressed above."	Public involvement opportunities for carp removal have been numerous. In addition to the public scoping process and comment period, partners to the JSRIP have met with several other organizations and made substantial effort to inform the public of the carp removal plan.	See Section 1.5.

		The JSRIP has worked with the Utah Division of Wildlife Resources to organize the Utah Lake Fish Forum to make information about June sucker recovery and carp removal available to those who use Utah Lake. The Fish Forum met five times over the last 18 months and meetings were attended by representatives from Salt Lake County Fish and Game. The JSRIP also made information on carp removal available at the 2009 Utah Lake Festival and communicated with several individuals about the carp removal project. Over 3,500 people attended the 2009 Utah Lake Festival. The JSRIP has also made numerous presentations to the various committees of the Utah Lake Commission, which represents local municipalities and agencies. These presentations included a meeting with the Utah Lake Commission public advisory group which includes a representative of the Sierra Club. A representative from Utah Waters participates on the JSRIP technical and administration committees. Two committees that have unanimously supported the current direction the JSRIP has taken with carp removal.	
	"Status of funding has not been discussed in sufficient detail. It is stated that funding has been secured for one year. It is not clear that funding is available for later years or for a maintenance program. Prior to program start there is a need provide assurance that funding will be available."	Adequate funding for one year of carp removal has been secured and efforts are being made to find additional funding for future years. In addition, partners to the JSRIP are continuing to work with interested parties on potential marketing solutions for carp or	See Sections 1.4 and 2.2.

		carp products that would offset some costs associated with removal. The entire carp removal project will require a budget between $5.5 and $8 million. While efforts have been made to secure such funding it is unlikely that the entire amount will be made available up front.	
	"The Program is already making great strides in habitat rehabilitation in tributary spawning areas and in the artificial culturing and stocking of June sucker. Progress in efforts on Hobble Creek, Spanish Fork River, and the Lower Provo River are all anticipated to pay huge dividends in spawning and recruitment for June sucker in the future. Successful efforts to artificially spawn, rear, and stock June sucker has resulted in increases in the June sucker populations in the lake and in numbers ascending the various tributaries to attempt to spawn."	The Service agrees that great progress has been made towards recovery of June sucker. This progress has been the result of cooperative efforts towards a balanced approach to recovery. Efforts towards augmentation, habitat improvements, water management, and public outreach will continue along with carp removal. The JSRIP will continue to operate in an adaptive management framework on multiple projects to move towards recovering the June sucker.	See Section 1.2.

DEPARTMENT OF
ANTHROPOLOGY

December 8, 2009

Chief, Division of Wildlife and Sport Fish Restoration
U. S. Fish and Wildlife Service
P.O. Box 25486
Denver, Colorado, 80225.

Sirs:

I am grateful for the opportunity to comment on the Draft Environmental Assessment for the Removal of Nonnative Carp in Utah Lake to Support June Sucker Recovery.

First of all, that I am fully supportive of the proposal to remove carp from Utah Lake. I am in total agreement that removing the carp, or at least substantially depressing the carp population, will have significant benefits to the lake ecology. This would especially be the case for waterfowl. To strengthen your case for improved conditions for waterfowl you might consider discussions with managers of the Bear River Waterfowl Refuge where carp control on holding ponds dramatically increases waterfowl use.

Secondly, I found the section on cultural resources woefully inadequate. Although Robert Carter's contributions to understanding and documenting the recent history of human use of Utah Lake is important and considerable, his work does not delve into the pre-European history in any detail. Please accept the following references to bolster your cultural resources discussion and for future reference. These include detailed descriptions of historic Native American as well as earlier uses of, and site distribution around Utah Lake.

Janetski, Joel C., and Grant C. Smith
2007 *Hunter-Gatherer Archaeology in Utah Valley*. Occasional Papers No. 12. Museum of Peoples and Cultures, Brigham Young University.
Janetski, Joel C.
2004 *Archaeological Survey and Limited Excavations in Utah Valley*. Museum of Peoples and Cultures Technical Series 04-19. Brigham Young University, Provo.
Janetski Joel, C.
2002 Late Paleoindian Artifacts from Utah Valley. *Utah Archaeology 2001* 14(1):15-26.
Janetski, Joel C., John McCullough, Karen Lupo, and Shannon Novak
1992 The Mosida Site: A Middle Archaic Burial from the Eastern Great Basin. *Journal of California and Great Basin Anthropology* 14:180-200.
Janetski, Joel C., and Ron Martin
1992 Harpoons from Utah Lake. *Utah Archaeology 1992* 5(1):149-154.
Janetski, Joel C.
1991 *The Ute of Utah Lake*. Anthropological Papers No. 116. University of Utah Press, Salt Lake City.

BRIGHAM YOUNG UNIVERSITY · 800 SWKT · PROVO, UTAH 84602

Janetski, Joel C.
1990 Wetlands in Utah Valley Prehistory. In *Wetland Adaptations in the Great Basin*, edited by Joel C. Janetski and David B. Madsen, pp. 233-258. Museum of Peoples and Cultures Occasional Papers No. 1. Brigham Young University, Provo.
Janetski, Joel C.
1990 Utah Lake: Its Role in the Prehistory of Utah Valley. *Utah Historical Quarterly* 58(1):5-31.
Reagan, Albert B.
1935 Archaeological Report of Field Work Done in Utah in 1934 and 1935. *Proceedings, Utah Academy of Science* 12:50-88.
Steward, Julian H.
1933 Early Inhabitants of Western Utah. *Bulletin of the University of Utah* 23(7):1-34. Salt Lake City.

All of the above are available to the public. Additional literature on archaeological research done in Utah Valley is available through the Antiquities Section, Utah Division of State History, Salt Lake City.

What these several publications make clear is that the prehistory of Utah Valley is rich indeed, and that Utah Lake and its abundant native fishery as well as the associated water-loving plants and animals were critical to the societies that flourished in the valley from at least 10,000 years ago to the present. Archaeological sites are abundant on the lake shore, especially on the northern, eastern and southern portions. In addition, sites (see Reagan 1935), including human burials (see Janetski et al. 1992), are present below compromise level of the lake.

That said, I tend to agree with your finding of no significant impact on cultural resources with the mechanical removal of carp alternative unless processing facilities are constructed on or near the lake shore. This would include Bird Island. Any such construction should consider the possibility of damage to archaeological sites, and an archaeological clearance should be completed. That clearance should include subsurface tenching given the real potential for buried cultural deposits not seen on the surface (see chapters in Janetski and Smith 2007 for evidence for buried sites).

Thank you for listening.

Joel C. Janetski
Professor

cc: Lori Hunsaker, Utah State Historic Preservation Office
Kelly Beck, Utah Public Lands Policy Coordinator Office
Kevin Sloan, USFWS, Lakewood, Colorado

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

230 South 500 East, Suite 230, Salt Lake City, UT 84102-2045
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December 11, 2009

David McGillivary, Chief
Division of Wildlife and Sport Fish Restoration
U. S. Fish and Wildlife Service
P.O. Box 25486
Denver, Colorado 80225

Subject: Review of the Draft Environmental Assessment for Removal and Control of Nonnative Carp in Utah Lake to Support June Sucker Recovery

Dear Mr. McGillivary:

We have reviewed the Draft Environmental Assessment for Removal and Control of Nonnative Carp in Utah Lake to Support June Sucker Recovery. We support the preferred alternative for the use of mechanical removal to reduce the common carp population in Utah Lake by at least 75 per cent and maintain the population at or below reduced levels. This alternative will enhance the environmental conditions in Utah Lake and improve the recovery potential for June Sucker. We have no additional comments.

The Mitigation Commission is an independent Federal agency established by the Central Utah Project Completion Act of 1992 and is a participating agency in the June Sucker Recovery Implementation Program. The Commission is responsible for planning, funding, and implementing projects that benefit fish, wildlife, and related recreation resources in order to offset impacts caused by the Central Utah Project and other Federal water reclamation projects in Utah.

We appreciate the opportunity to review and comment. If you have any questions, please contact Maureen Wilson at the phone number above.

Sincerely,

ACTING FOR Mark A. Holden

Michael C. Weland
Executive Director

cc: Reed Harris, JSRIP Program Director

December 4, 2009

Chief, Division of Wildlife and Sport Fish Restoration
U. S. Fish and Wildlife Service
P.O. Box 25486
Denver, CO 80225

To Whom It May Concern:

I was recently informed of the recently-released draft environmental assessment for the purpose of enhancing environmental conditions in Utah Lake in order to improve the recovery potential for the June sucker by reducing the abundant population of common carp.

The Utah Lake Commission, a group comprised of 21 local government officials and state agency leaders, recently completed a master plan for Utah Lake and has begun the plan's implementation. The plan identifies numerous goals and objectives that will guide the Commission, municipalities, state and federal agencies that have regulatory control of the land and resources in and around Utah Lake and encourages a coordinated approach to land use and resource management.

The Commission agrees that there is a need for the proposed action of reducing the current population of common carp in Utah Lake by a minimum of 75% and maintain the population at or below this reduced level, and to monitor and evaluate the ecological response of the Utah Lake system. It views that the completion of this project will not only aid in the recovery of the June sucker, but also help accomplish many of the goals and objectives identified in the Utah Lake Master Plan.

In the plan, the Commission has identified numerous goals and objectives that it is pursuing as it works toward helping the lake become a more natural and better-understood resource. These goals and objectives entail many different aspects of the lake including Land Use, Transportation, Natural Resources, Recreation, and Public Facilities.

The top priority of the Commission, which is identified in the master plan, calls for appropriate steps to control invasive plant and animal species in and around the lake. The presence of carp and its damaging effects on the lake's ecosystem was the primary reason for the creation of this goal. The Commission supports efforts to reduce the carp population in the interest of improving habitat and increasing populations of native and other desirable plant and animal species.

The plan also identifies a goal that encourages a proactively managed fish community that will help the June sucker to recover and that supports a compatible recreational fishery through the control of undesirable or incompatible species, which includes carp.

Utah Lake Commission
Historic Utah County Courthouse
51 South University Ave.
Suite 109
Provo, Utah
84601

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www.utahlakecommission.org

Additionally, the removal of the carp will help the Commission achieve the goal of improved water quality as natural species of vegetation return to the lake.

The Utah Lake Commission supports the preferred alternative identified in the draft environmental assessment of reducing the population of carp in Utah Lake by 75% of current levels using mechanical removal, unless more efficient, yet viable methods of removal can be designed, and to maintain the population at or below this reduced level. The proposed action will greatly benefit the quality of life for the citizens of Utah. I urge you to issue a Final Environmental Assessment and a Finding of No Significant Impact.

Sincerely,

Reed S. Price
Executive Director
Utah Lake Commission

cc: Lewis K. Billings; Mayor, Provo City and Utah Lake Commission Chair
Larry A. Ellertson; Commissioner, Utah County and Utah Lake Commission Vice Chair
Mike Styler; Director, Utah DNR
Reed Harris; Utah DNR and the JSRIP
Chris Keleher; Utah DNR and the JSRIP
Michael Mills; JSRIP

Comments on Draft EA for Utah Lake Carp Removal

December 17, 2009

We, the undersigned groups and individuals, are pleased to provide and endorse the following comments on the "Draft Environmental Assessment for Removal and Control of Nonnative Carp in Utah Lake to Support June Sucker Recovery".

Although the environmental community is generally supportive of efforts to remove exotic, introduced common carp from Utah Lake as part of a broader effort to recover the endangered June sucker, we have serious concerns about the adequacy of the draft EA. To summarize, we consider the preferred alternative, as identified in the draft EA, as too simplistic and lacking in supporting research. In addition, unless fundamental alterations are made in the hydrology and/or water quality of Utah Lake we believe that this entire investment will not lead to any meaningful change in the Utah Lake ecosystem and a substantial public investment will essentially be wasted. Moreover, other potential alternatives that should have been presented in this document were dismissed from detailed evaluation without adequate justification. As a result, we conclude that the draft EA should be replaced with a full EIS, including a robust presentation of alternatives and much more extensive effort at public involvement.

The following discussion is provided in support of these basic conclusions:

#1 - Increased Competition between Young Carp and All Ages of June Sucker

How does the recovery program intend to deal with the explosion of a new population of smaller carp and their almost certain additional recruitment into the adult population? In the presentation of their multiple year study examining the potential for carp removal success on Utah Lake, SWCA was very clear in its prediction and rationale for such an explosion of young carp. Therefore, the outcome of initial carp removal efforts would result in what may be direct carp competition with expensive, stocked young June sucker. Because the current adult carp population is obviously stunted at a mere average weight of about only 4½ pounds (some of the smallest carp in the state), reductions in the population will undoubtedly result in reduced competition between individual adult carp. Reduced competition between individual adult carp will result in increased growth and improved condition of any remaining carp. These larger, healthier adult carp will produce more and larger eggs, resulting in greater hatching and survival rates of individual carp eggs and healthier and more numerous young larval carp.

Because food resources for larval fish have never been proven to be limited in Utah Lake, it is expected that larval carp (and other larval fishes) will grow at the current fast rates. Given that carp possess a more generalized tooth and digestive tract, their food processing system will allow them to out-compete the more specialized June sucker and, therefore, to grow at fast rates until they are too big to be eaten by any of the lake's predators. June sucker simply do not possess the flexibility of carp to turn to other resources in the face of the direct competition anticipated between the two species. The result could be a significant increase in direct competition between an expanding population of younger common carp and young stocked or naturally reproduced June sucker. Increased competition between young carp and sucker should, therefore, result in

slower growth rates in young June sucker as compared to young carp, disproportionately exposing young suckers to increased predation.

It is also reasonable to expect that these new, more numerous young carp will compete directly with adult June sucker, reducing the sucker's fitness and ability to reproduce at the time when it is hoped they will start using tributary streams that the Program has rehabilitated for that purpose.

#2 - Increased Predation on June Sucker

It is expected that with a combination of more and more stocked and naturally reproduced June sucker and an exploding population of younger carp, populations of virtually all predatory fishes in the lake will also grow. In addition, omnivorous adult carp are well known predators on their own larvae; accordingly, it can be expected that reductions in their numbers through direct removal will reduce their own current cannibalistic predatory rates, thereby increasing survival rates of their own larvae. Because the adult carp population in the lake is so large these predatory rate reductions would be significant. Adult carp in Utah Lake are not known to feed on young fish that can grow to larger sizes, mostly the result of mouth gape size. If competition with carp is reduced, other predator populations are sure to respond with disproportionate predation on young June sucker because suckers possess a more fusiform body shape, lack fin spines, and have smaller scales. Carp have deeper bodies, anal and dorsal spines, and larger scales, all predatory defense adaptations not possessed by June sucker.

#3 - Lack of a Carp Management Plan

The Program started the production of a "carp management plan" years ago. Understanding the importance of such a plan for adaptive management, the environmental community has offered assistance in completing it. Nonetheless, the Program has decided to not follow through and develop the management plan. Without such a plan, the environmental community fears that the Program will not be able to adapt to the rapid changes in fish populations and their sizes, predation rates, and intra- and inter-specific competition that will impact the success both of stocking and of anticipated natural reproduction. The Program is currently using only one commercial fisherman and his only current fishing method, seining, is not well adapted to the high water levels where carp can penetrate heavy cover along the shorelines. As a result, most spawning adult carp are essentially out of reach for long periods of the year. Although there are a variety of other harvesting techniques, few of them have been investigated as they should have been through the development of a carp management plan.

Both the artificial culture and stocking of June sucker, as well as the development of habitat needed for their natural reproduction, is now and will continue to be a very expensive undertaking. The public needs to know that its money is being well spent, and the carp removal program as currently designed does not provide that assurance.

#4 - Lack of Other Obvious Alternatives

According to the CEQ regulations for implementing NEPA, the analysis and comparison of alternatives is considered the "heart" of the NEPA process. We note that the EA briefly considers a number of possible alternatives, but dismisses them from further analysis. As a

result, the document presents in-depth analysis on only the preferred alternative and the no-action alternative. We consider this a significant flaw in the document.

Where are the other alternatives to carp removal as a means to recovering aquatic vegetation and improving water quality in Utah Lake? The environmental community has gone on the record for years to recommend that efforts to restore more natural water level fluctuations would go farther to restoring aquatic vegetation and improving water quality than carp removal. Why is this alternative not being considered? History of the lake suggests that aquatic vegetation started disappearing in Utah Lake after people dammed its natural outlet and started using it for a water storage reservoir, long before the introduction and expansion of common carp. The addition of a pump house at its outlet is believed to have been even more destructive to aquatic vegetation, as it allowed for a faster, lower drawdown of water levels, well below that required for the survival of native aquatic plants. Since aquatic plants cannot inhabit the area that is desiccated periodically, this greatly enlarged the "no plant area" of Utah Lake. A recent study commissioned by the Program demonstrated that the combination of damming and pumping has created a much more radical fluctuation rate in the lake than had occurred historically. Therefore, efforts to return the lake to more natural fluctuation rates and zones of fluctuation is a precondition to the return of vegetation lost to these operational management schemes.

#4 - Lack of Necessary Cooperation by Water Users

Even if carp removal is chosen as part of a preferred alternative, ways of returning the lake to these more natural water level fluctuation rates should be investigated as a means of encouraging the return of aquatic vegetation. The public needs to know that carp removal will be very expensive and will focus the Program's energy away from its other worthy efforts of habitat rehabilitation of the tributary streams and saturating the system with June sucker (see Carp Will Be In Even Bigger Trouble With Status Quo, below). Historical, current, and anticipated methods for removing carp in Utah Lake are far more efficient when water levels are lower, especially during drought years. Harvest rates of carp drop dramatically with higher water levels, as the fish penetrate existing shoreline vegetation. Because carp populations have a well know ability to rebound, efforts to eradicate them will need to be seamless and continuous to achieve the goals needed for success. Unpredictable weather patterns can and will adversely effect rates of carp removal.

Without the ability to drop water levels to enhance carp removal, especially as the Program nears success when diminishing returns challenge removal efforts, it is possible that all previous carp removal efforts will be wasted. This would force the Program to essentially start all over again! We think this expenditure of public funds for carp removal is far too risky in the absence of adequate cooperation with involved water users to manage water levels, especially when the issue has not been adequately studied. The environmental community has not seen the kinds of cooperation nor interest in investigating ways to manage Utah Lake levels that would either promote the return of aquatic vegetation through the reduction of fluctuation rates nor to allow carp removal efforts to be successful enough to positively benefit June sucker. Nor has it seen complete Program support by water users to prevent the introduction of highly ecologically destructive exotic mussels into the lake and connected waterways that would surely undo much

progress in June sucker recovery, and curiously, even endanger the water users' own systems, operations, and management.

#5 - Carp Are Already In Trouble

The most overlooked, rational alternative to carp removal is the No-Action Alternative. The Program already knows that carp have not been doing well in Utah Lake for many years. Because the lake is so large, shallow, and featureless, it does not provide the kinds and sizes of foods necessary for a healthy carp population. Adult carp are obviously not well adapted to subsist on midges for most of their diet, and do not have the ability to efficiently strain abundant zooplankton. In this regard, all ages of June sucker are immensely better adapted to the lake and its available food resources. As a result, Utah Lake may have the smallest, stunted carp in the entire state, averaging only about four and a half pounds each and only rarely reaching a maximum size of less than 15 pounds. Carp populations in most other waters found at the same elevation are more than twice as big in both average and maximum size.

The lake's carp are in such poor health that the population already routinely experiences almost complete reproductive and recruitment failures about two out of every five years. These failures usually correlate to drought conditions that drop lake water levels below available spawning and cover habitat. Without appropriate vegetation to stick to, the already small carp eggs, with their inadequate fat stores (the result of the poor condition of stunted spawning female carp), simply do not survive to hatch at rates high enough to saturate the system with young carp larvae. Fewer, less fit carp larvae simply cannot overcome the predation of the lake's numerous predators, especially during extended droughts, when entire year classes of carp seem to disappear. It is of no surprise that the number one predator on carp larvae and eggs are, indeed, their extremely abundant, starving, opportunistic, and omnivorous parents. Common carp are well known predators due to their extremely versatile feeding morphology. They possess a mouth well adapted to suck up small helpless carp fry and eggs in large quantities, a variety of generalist-oriented teeth to process them, and a digestive tract that is able to handle animal as well as plant foods. Eggs scattered in the shallower, structure-less shoreline waters during droughts do not hatch as well, and any that do are quickly consumed by both carp and many of the lake's other willing predators.

#6 - Carp Will Be In Even Bigger Trouble With Status Quo

There is no evidence that common carp out-compete June sucker, so this has never been a primary reason for removing carp from Utah Lake. Quite to the contrary, it has been proven that June sucker can and do out-compete carp. June sucker and Utah sucker both possess specialized feeding morphology and behavior that allow them to feed lower on the food chain. As carp grow larger they are less capable of feeding on the smaller plants and animals that June sucker use as their primary source of food. Because these smaller plants and animals support the lake's entire food chain these suckers are able to consume the energy that would otherwise flow up the food chain to the already starving adult carp population. This point is especially well demonstrated by the fact that all of Utah Lake's suckers are, and have always been, in great condition while adult carp are virtually starving to death.

While younger carp may, indeed, compete directly with all ages of June sucker, the adults cannot. With more energy consumed by the steadily growing population of June sucker lower in

the food chain, the existing carp will be less fit and less able to spawn and recruit to adulthood. As we have suggested above, (see Increased Competition between Young Carp and All Ages of June Sucker, above) the removal of adult carp will most likely result in an "explosion" of new, younger, faster growing carp, along with unpredictable impacts on the growth and size distributions of all of the other introduced, exotic predatory fishes. In comparison to that scenario, the status quo may be far more predictable, while at the same time saving the public the enormous costs and hassles relative to removal and disposal of carp.

#7 - We Anticipate Fewer Adult Carp Regardless of Removal Efforts

The Program is already making great strides in habitat rehabilitation in tributary spawning areas and in the artificial culturing and stocking of June sucker. Progress in efforts on Hobble Creek, Spanish Fork River, and the Lower Provo River are all anticipated to pay huge dividends in spawning and recruitment for June sucker in the future. Successful efforts to artificially spawn, rear, and stock June sucker has resulted in increases in the June sucker population in the lake and in numbers ascending the various tributaries to attempt to spawn. All of these efforts are and will steadily increase the numbers of young and adult June sucker in Utah Lake for the future. With increasing numbers of suckers comes increasing rates of interrupted energy flow to already struggling common carp populations, leading to an increasing decline in the general health of carp, diminishing reproductive success, and ultimately, fewer and fewer year classes of carp recruiting into adulthood. These trends are already evident.

Environmental Community Supports the EIS Instead of EA Approach

The environmental community cannot in, good faith, support an Environmental Assessment (EA) approach as a justification for quickly forward with carp removal. The following are some of the many reasons why this effort should require a full Environmental Impact Statement (EIS) to allow for a more complete development of alternatives, including the very attractive no-action alternative, which is essentially the status quo.

A) There are simply too many unanswered questions about how carp and all of the many other exotic and native Utah Lake fishes will respond to removal efforts, including the predicted "boom" of younger carp and solutions to the problems this boom will undoubtedly cause for June suckers of all age classes.

B) There is little, if any, actual proof that carp were or are currently responsible for all of the declines in aquatic vegetation in the lake in the first place, evidenced by the fact that large populations of even larger carp can be found living in concert with healthy stands of emergent aquatic vegetation in many other shallow waters found at the same general elevation in the area.

C) There has been little progress in studies demonstrating that current artificial water management has not been the main cause for the historic declines in the lake's vegetation, undermining faith in the long term success of the carp removal option.

D) There has been no progress on studies examining any potential to artificially manage lake water levels to enhance carp removal efforts, especially as carp removal efforts near completion when unfortunate wet weather patterns and resulting higher water levels could undermine the

entire removal effort. Without the ability to keep the lake's water levels low to either expose adult carp to continued harvest rates needed to "break-the-back" of the population, nor to expose anticipated increases of younger carp to predators, many of these more numerous, younger carp will quickly recruit to adulthood and undo gains already made in removal efforts.

E) There has been no progress on the development of a Carp Management Plan to guide any adaptive management as removal efforts confront the unavoidable challenges of changing weather patterns, changing fish populations and diminishing returns of carp removal.

F) Program participants have not demonstrated adequate recent support for the prevention of exotic zebra and quagga mussel's introduction into the lake and entire drainage, a development that would change the entire ecosystem, and even the need to do carp removal at all!

G) There has been no progress on studies examining the potential to reduce the rates of water fluctuation caused by management of the lake as a water storage reservoir, which has been destructive to the aquatic vegetation that is so valuable to the lake's entire ecosystem and even to the improvements in water quality for downstream water users.

H) We believe the most important, major alternative for NEPA consideration, in the absence of more fully developed alternatives not currently under consideration, is the "No Action Alternative", as stated above.

I) The Program is already compromising its honor by moving ahead far too rapidly with the magnitude of its carp removal efforts in the absence of required NEPA relative to the current level of monetary expenditure, which is now far beyond any "pilot" study level. We believe that the Federal Government requires a more prudent approach, with higher levels of public involvement, thus allowing the public to catch up with what is NOT yet known about carp removal, as previously expressed above.

J) The timing of carp removal is out of sequence with preferred drought conditions as current high water levels make harvesting carp year-round much more difficult, especially during their extended spawning period when they penetrate emergent shoreline vegetation inaccessible to harvesting equipment. We believe that delaying any such effort until weather conditions are more favorable will allow a much faster and efficient removal rate required to accomplish the stated carp removal goals.

K) Status of funding has not been not been discussed in sufficient detail. It is stated that funding has been secured for one year. It is not clear that funding is available for later years or for a maintenance program. Prior to program start there is a need provide assurance that funding will be available.

In Conclusion

Because of the concerns stated above, as well as other political, social, and economic arguments too numerous to discuss here, we think good NEPA practice requires a more comprehensive

environmental analysis than we find in the draft EA. The current draft EA, which focuses solely on carp removal in the absence of other considerations, is deficient in its presentation of alternatives and lacks an appropriate level of public involvement for a program of this magnitude and complexity. Absent a comprehensive analysis that an EIS could provide, we are at this point convinced that the No-Action Alternative is the most sensible interim strategy, is least expensive for the Program and American taxpayers, and yet still allows for carp removal efforts in the future when the Program has more information and guaranteed funding to ensure success. Moreover, it will allow time for the Program to design a more balanced, scientifically defensible approach to restoration than the one-sided approach we currently observe. We have discussed some of the Program's controversial aspects with experts at the national level, and are convinced that this rush into the unknown is neither prudent nor timely. In view of all of the above concerns and considerations, we conclude that the public interest would be better served by setting aside the current draft EA and developing a more comprehensive EIS, complete with an appropriate level of public involvement.

Thank you for all your considerations.

Darrell Mensel, Utah Waters

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James Wechsler, Sierra Club Southwest Waters Action Team

Jeff Salt, Great Salt Lakekeeper

Ann O'Connell, Citizen

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APPENDIX B: BIOLOGICAL ASSESSMENT FOR REMOVAL AND CONTROL OF NONNATIVE CARP IN UTAH LAKE TO SUPPORT JUNE SUCKER RECOVERY

Biological Assessment
for
Removal and Control of Nonnative Carp
in Utah Lake to Support June Sucker Recovery

Department of the Interior

U.S. Fish and Wildlife Service

January 2010

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1.0 Introduction

The U.S. Fish and Wildlife Service (Service), Utah Department of Natural Resources (DNR), Utah Division of Wildlife Resources (UDWR) and other partners at the June Sucker Recovery Implementation Program (JSRIP), are proposing to enhance environmental conditions in Utah Lake, Utah to improve the recovery potential for June sucker (*Chasmistes liorus*), by implementing a large scale common carp (carp) (*Cyprinus carpio*) removal program. Large scale carp removal is intended to achieve June sucker recovery goals. High carp densities in Utah Lake have removed much of the submerged vegetation that provided predator refuge for larval and juvenile June sucker. The goals of the project are to:

1) reduce the current population of carp in Utah Lake by a minimum of 75 percent;
2) maintain the population at or below this reduced level; and
3) monitor and evaluate the ecological response of the Utah Lake system.

Progress towards recovery of the endangered June sucker has been positive over the past decade in areas such as water management, habitat enhancement, and augmentation. However, ecosystem, community, and species-specific impacts associated with the nonnative carp population limit the recovery potential for the species. Carp dominate the Utah Lake fish community, both in numbers and biomass, and through their foraging behavior, eliminate the potential for restoring aquatic plants that provide habitat complexity and cover from predators. A more balanced fish community and productive fish habitat should result from decreased carp numbers in Utah Lake.

The purpose of this document is to assess the effects of the proposed action on biological resources protected under the Endangered Species Act (ESA). Section 7(c) of the ESA requires a federal agency to prepare a biological assessment (BA) to disclose effects of a proposed action on threatened or endangered species listed by the Service. Threatened or endangered status is assigned to individual species by the Service. The BA is used by the Service to determine if there is an effect on a listed species, or an adverse modification of critical habitat for federally listed species.

2.0 Agency Coordination

An Environmental Assessment (EA) was prepared to assess the environmental effects of the proposed carp removal project. The Service and representatives from DNR, UDWR, and partners to the JSRIP cooperatively prepared the EA and discussed potential impacts and benefits of the project on June sucker.

The JSRIP is a multi-agency cooperative effort designed to coordinate and implement recovery actions for the June sucker. The JSRIP includes conservation activities and actions to recover and enhance June sucker habitat and to minimize impacts associated with competition and habitat modification from nonnative species.

During preparation of the EA, the Service identified the federally listed endangered, threatened, or candidate species that may occur within the area of the proposed action. These species are: June sucker, Ute ladies' tresses (*Spiranthes diluvialis),* and y*ellow-billed cuckoo (Coccyzus americanus).* Table 1 identifies the potential of occurrence of each species within Utah Lake.

Table 1. Endangered, Threatened, or Candidate species that may occur within the project area.

Species	Potential for Occurrence
Endangered Species	
June sucker (*Chasmistes liorus*)	Inhabits Utah Lake. Spawning populations occur in the lower Provo River, Spanish Fork River, and Hobble Creek; with the potential for other tributaries to support future spawning populations.
Threatened Species	
Ute ladies' tresses (*Spiranthes diluvialis*)	Known to occur in wetland areas around Utah Lake and its tributaries, with populations documented in areas near Springville and American Fork cities.
Candidate Species	
Yellow-billed cuckoo (*Coccyzus americanus*)	Observations of cuckoos near Utah Lake include areas along the Provo River, the Brigham Young University Agricultural Station north of Salem City, and near Springville City.

None of the species shown in Table 1, with the exception of the June sucker, would be affected under the proposed action because they do not occur in habitat or geographic areas that could be affected by project activities. Therefore, no further discussion is included in this BA for the Ute ladies' tresses or yellow-billed cuckoo.

June sucker have the potential to be affected by project activities through the mechanical netting and trapping of carp. A detailed description of the June sucker and its habitat is provided in Sections 4.0 and 5.0 of this BA. Potential project-related impacts to the species and its habitat are addressed in Section 6.0.

3.0 Proposed Action

Commercial fishing operations would use boats, large nets (primarily seines) and hand labor to capture and remove about five million pounds of carp annually from Utah Lake over a six year period. The use of trapping, electricity, trawling, or baiting may also be used in specific, localized situations such as tributaries, canals, near shore areas or other areas where larger seines cannot be effectively deployed. Carp would be transported to various existing access locations around the lake for offloading and disposal outside of the lake environment. Carp would not be disposed on the shores of Utah Lake.

The JSRIP would contract with commercial fishing operations to remove carp using fishing methods approved by the UDWR. Fishing operations are proposed to occur for at least 120 days per year primarily from September to April, the time of year earlier pilot efforts have indicated are most effective for carp removal. Activities may extend outside these times if it is necessary to meet the annual removal target of five million pounds of carp.

Two to three fishing crews operating boats for fishing and transport of catch would be employed in this effort. A crew would typically consist of four to five people in three boats. Two boats are necessary for efficient seining, while the third boat would be used for transport. Between 10 and 20 boatloads of carp per day would move from open water to offloading points around the lake in order to catch and remove a target of at least 46,000 pounds of carp per day over the 120-day period. All commercial fishing operations are required to comply with the State of Utah's regulations relating to the commercial harvest of fish, including the acquisition of appropriate permits and certificates of registration. The UDWR has the authority to manage fish and wildlife resources of the State and would approve appropriate fishing methods and equipment and establish all rules for the species and number of fish that can be removed. All activities will be regulated under existing state law.

Fishing may take place during winter conditions when ice cover is present on Utah Lake. Winter fishing would typically involve one to two crews, each consisting of five to eight people working on top of the ice. Nets would be deployed through a series of 50 to 70 holes (2 ft by 2 ft) in the ice and retrieved to a large "take-out" hole (10 ft by 5 ft). Fish are removed through the "take-out" hole and transported to the shore by trailer.

This large scale removal effort may require some facility improvements to facilitate the deployment of commercial fishing equipment and the offloading of fish from fishing boats. The necessity of improvements and the exact locations and design plans for such improvements are not known at this time. A separate consultation will be initiated with the Service prior to any construction or improvement of facilities associated with this project.

Incidental take of June sucker would be minimized by using gear types that reduce the likelihood of June sucker capture, limiting harvest efforts to areas outside of where June sucker are known to congregate, and removing June sucker from the catch and returning them to the lake unharmed as soon as they are observed. The current augmentation of the Utah Lake June sucker population from culture and refuge facilities would more than offset any incidental take associated with large-scale carp removal. Table 2 shows the number of June sucker stocked in Utah Lake from 1991 to 2009.

Table 2. Number of June sucker stocked in Utah Lake from 1991 to 2009.

Year	Number of June sucker stocked
1991	0
1992	0
1993	0
1994	1,557
1995	1,221
1996	312
1997	0
1998	0
1999	692
2000	0
2001	2,695
2002	2,396
2003	2,384
2004	26,002

2005	13,607
2006	3,710
2008	53,656
2009	55,897

4.0 June Sucker Status

The June sucker is an endangered fish species endemic to Utah Lake and the lower Provo River. Once a locally abundant species, it was listed as endangered by the Service in 1986, with 4.9 miles of the lower Provo River, from the Tanner Race diversion to Utah Lake, designated as Critical Habitat (51 FR 10857).

The early life history of the species is poorly understood. Larvae apparently drift down to the lake relatively quickly after spawning (Radant and Sakaguchi 1981; Radant and Shirley 1987; Modde and Muirhead 1990). It is thought that many of the spawning tributaries originally had deltas into the lake that would have provided young suckers with food, cover, and space for growing. These habitats no longer exist, with the exception of the newly created habitat at Hobble Creek. It is thought that historically juveniles lived in or around lake margins. Research (Peterson 1996) indicates young are very susceptible to predation by white bass, although they will seek cover if it is available. Predation on young June sucker, either in the dredged lower Provo River channel, or in Utah Lake, is the major factor in poor recruitment to the adult population (USFWS 1999). Lack of rooted aquatic vegetation and other hiding cover in the lower Provo River and in the lake is a contributing factor to predation.

The number of adult June sucker spawning in the Provo River is estimated as a measure of population status each spring (USFWS 1999). From 1979 to 1985, the number of spawners never exceeded 500 fish. During the 1990s, collections of June sucker spawners in the Provo River were less than 100 fish, and occasionally were less than 50 fish. In 1998, estimates placed the entire wild population size at approximately 300 individuals (Keleher et al. 1998). Due to improvements in detection technology and increased hatchery production more spawning adults were documented in the Provo River during the early 2000's. By 2008, more than 900 adult suckers were documented using the Provo River during the annual spawning run (UDWR 2009). Aging of various groups of June sucker collected in the 1980s and 1990s found few fish less than 10 years of age, suggesting recruitment and survival of juveniles is inadequate (USFWS 1999). Stocking of June sucker has increased population numbers, however, natural recruitment to the adult population remains poor due to a lack of larval and juvenile refuge habitat, and predation by white bass and other introduced predators.

The Provo River, the largest tributary of Utah Lake, historically has been the major spawning tributary for June sucker, but other tributaries were likely used prior to changes that made them unavailable or unsuitable for the species. Radant and Sakaguchi (1981) noted adult June sucker in spawning condition near the mouth of the Spanish Fork River. The lowermost irrigation diversion structure on the Spanish Fork River likely prevents the species from accessing additional spawning habitat (Radant and Shirley 1987). Partners to the JSRIP have restored lower Hobble Creek to provide habitat conditions more favorable to June sucker. As a result, approximately 100 June sucker were documented using Hobble Creek in 2009 during the spawning season.

Factors that have contributed to the reduction in June sucker numbers include changes that have occurred both in Utah Lake and in historical spawning tributaries. In Utah Lake, these effects include changes in chemical and physical habitat, introduction of exotic predators, introduction of other species (carp), and reductions in aquatic vegetation. Limiting factors include water management (primarily irrigation use) that has reduced stream flows during critical spawning times, reductions in available spawning habitat caused by impassable barriers associated with irrigation diversions, introduction of exotic predators, loss of spawning habitat, poor water quality, and channelization or channel simplification.

The introduction of nonnative fishes into Utah Lake has resulted in competition and predation as well as water quality and habitat changes such as increased turbidity and a reduction in aquatic macrophytes. Loss of recruitment has resulted from a combination of the above factors. To increase June sucker survival the JSRIP has investigated the potential for removing or reducing carp populations in Utah Lake. The results of two studies indicated that it would be possible to reduce and control carp populations in the lake using mechanical harvest methods (SWCA 2005; SWCA 2006). Since completion of those studies, the JSRIP has conducted pilot projects to determine the level of effort needed to effectively reduce the carp population and to identify means of disposal for removed fish. As a partner to the JSRIP, the Service is contributing to the carp removal effort.

5.0 Environmental Baseline

The environmental baseline includes past and present effects of ongoing human and natural factors leading to the current status of the June sucker and its habitat. The information in this section was derived predominantly from existing biological studies and communications with the JSRIP Technical Committee. The environmental baseline provides a platform to assess the known and potential effects of the proposed action.

The action area is defined by regulation as all areas that will be affected directly or indirectly by the Proposed Action and not merely the immediate area involved in the action (50 CFR §402.02). This analysis is not limited to the footprint of the action nor is it limited by the Service's authority. Rather, it is a biological determination of the extent of the proposed action on listed species. Subsequent analyses of the environmental baseline, effects of the action, and levels of incidental take are based upon the action area.

5.1 Status of the June Sucker within the Action Area

The June sucker is endemic to Utah Lake and its tributaries, although it has been introduced into other locations for genetic refuge purposes. The Provo River and other Utah Lake tributaries provide important spawning and nursery habitat for the June sucker. Within Utah Lake proper, Provo Bay appears important to June sucker in general and post-spawning adults in particular.

June sucker have been monitored regularly in the Provo River during their spawning run, since the early 1990s. Although, potentially confounded by other variables, the number of adult spawners using the Provo River has been used as an informal index of the overall June sucker population size. Table 3 shows the number of adult spawners observed in the Provo River from 1991 to 2009.

Table 3. Number of adult June sucker observed in the Provo River spawning run from 1991 to 2009.

Year	Provo River Captures
1991	35
1992	46
1993	38
1994	67
1995	24
1996	29
1997	15
1998	1
1999	6
2000	41
2001	37
2002	139
2003	168
2004	139
2005	0
2006	16
2007	266
2008	935
2009	661

Recent increases in the number of spawners is a result of a stocking program in which June sucker raised in hatcheries or refuge populations are released into Utah Lake. Natural recruitment to the adult population is low to non-existent. This lack of recruitment is correlated with the introduction of nonnative predatory fish and a lack of refuge habitat for young suckers. Available refuge habitat has been reduced through the channelization of Utah Lake tributaries and the reduction of aquatic vegetation within Utah Lake. One factor in the loss of aquatic vegetation is the abundant carp population. Through their feeding behavior, carp stir up lake sediments and uproot vegetation.

5.2 Existing Factors Affecting June Sucker Critical Habitat and the Ecosystem within the Action Area

5.2.1 Water Quality

Utah Lake is located in a sedimentary drainage basin which provides a high nutrient inflow. Human development in the drainage has increased the inflow of warm water, sediments, nutrients, and industrial residues (Fuhrman et al. 1981). According to the Utah Division of Water Quality (2007), the receiving waters of Utah Lake are currently impaired for total phosphorus and total dissolved solids. Eyring Research Institute, Inc. and Brigham Young University (1982) reported that pesticide, herbicide, and heavy metal pollution in Utah Lake is minor. Fuhrman et al. (1981) reported that evaporation naturally removed about 50% of the total water inflow and doubled the mean salt concentration. This loss of water and the resultant complete mixing of the shallow lake contribute to its turbid appearance. The abundant carp population also contributes to high levels of turbidity by stirring up sediments and removing rooted aquatic vegetation from the lake. These factors contribute to the

reduction of aquatic plants within Utah Lake and the lack of refuge habitat available for June sucker.

While Utah Lake is highly eutrophic and experiences high algal productivity, its overall level of algal productivity is controlled by a combination of high alkalinity, hardness, and turbidity. These attributes appear to cause the precipitation or chemical bonding of phosphorus (Fuhrman et al. 1981) and result in a reduction of total productivity. However, due to high available nitrogen and phosphorus during summer months, the lake exhibits large blue-green algal blooms, which greatly affect overall food web dynamics (Crowl et al. 1998b). Carp contribute to the amount of available phosphorus through their rooting activity and excretion of wastes (Chumchal et al. 2005).

Turbidity in Utah Lake is high (Secchi disk = 0.3 m) due to a combination of algal production, fine bottom sediment mixing, and nutrient loading. Historically, Utah Lake was dominated by rooted aquatic vegetation which probably protected the shorelines and shallow lake areas from wind-driven wave disturbance, thereby reducing turbidity levels. The abundant carp population has been a factor in eliminating much of the aquatic vegetation. Native fish populations present in Utah Lake prior to human settlement indicate the lake was historically less turbid. Sediment coring, however, suggests that Utah Lake may have been turbid for the last 100–200 years (Brimhill and Merritt 1981). Lake bed mixing, due to historical Utah Lake water level manipulations for water storage and carp foraging, may have biased the quality of minimal core samples analyzed by Brimhill and Merritt (1981).

5.2.2 Water Development

Development of Utah Lake as a storage reservoir began in 1872. A low dam was placed at the Jordan River outflow, this barrier increased the storage capacity of Utah Lake. A permanent irrigation pumping plant was built in 1902. Utah Lake is currently the largest water storage facility in the Provo River basin. In 1889, efforts commenced to construct high mountain reservoirs to store high spring flows for the low summer irrigation periods. Large water storage projects, including construction of Deer Creek Reservoir, were initiated after a drought in the early 1930's. Deer Creek Reservoir, the principle feature of the Provo River Project, was completed in 1941. It has an active storage capacity of 152,564 acre-feet. Approximately 120,800 acre-feet of Provo River water is stored in Deer Creek Reservoir. The reservoir also stores water imported from the Weber and Duchesne Rivers. Up to 37,200 acre-feet of water can be diverted annually from the Weber River for storage in Utah Lake.

Jordanelle Reservoir, also on the Provo River, is ten miles upstream from Deer Creek Reservoir and was first filled to capacity in the spring of 1996. It has a storage capacity of 372,000 acre-feet and is operated by the Central Utah Water Conservancy District.
Since 1849, the Provo River has been modified by multiple main channel diversion structures. Their construction, design, and placement have significantly reduced June sucker access to the Provo River. The Fort Fields Diversion dam, approximately 6 km (3.8 mi) upstream from Utah Lake, has functioned as a migration barrier in all but high flow years. In 2009, modifications to this diversion were completed to allow passage of June sucker and other species at all flows. The Tanner Race Diversion Dam, 7.8 km (4.9 mi) upstream of Utah Lake, is a total upstream barrier to June sucker migration and spawning.

Water withdrawal and reservoir operations can have significant, negative impacts on June sucker spawning. Natural tributary flows are diverted during the irrigation season by direct flow

water right holders. Direct flow diverters can reduce tributary flow to critically low or completely dewatered levels during June sucker spawning and larval occupation periods. Additionally, large storage facilities, including Deer Creek and Jordanelle Reservoirs, store Provo River spring flows, thereby reducing the magnitude and duration, and altering the timing of spring peak discharges. Reservoir operations can also impact June sucker spawning when operations of the reservoir are altered rapidly. Partners to the JSRIP have worked cooperatively to form a June sucker flow work group to guide reservoir operations and allocate water acquired to benefit June sucker. The flow work group develops annual flow recommendations for the Provo River to benefit June sucker spawning.

Because of human activity in the basin, river use by spawning suckers has been severely limited. Also, a reduction in the available river habitat, which has been significantly simplified and shortened (e.g., channelized), may have caused enough of a reduction in available nursery habitat so that historical growth rates are no longer possible. Additionally, there may no longer be enough river habitat available to allow adequate time for larval fish to progress from the swim-up stage to the dispersal stage before they enter the lake environment. The Provo River historically had braided channels with side-channel and other low velocity refuge areas. This riverine composition probably resulted in faster growth of larval fish due to both slower downstream dispersal and the possibility of residence in higher temperature, slow water areas. As a result, juvenile June sucker may have been larger, with better swimming abilities, when they reached Utah Lake. Loss of shallow water habitat (with lake-edge vegetation) due to carp in Utah Lake is also of concern. The importance of these shallow water nursery habitats to other lake-dwelling fish species has been well documented in Utah Lake (Heckmann et al. 1981), as well as for the *Chasmistes* genus (USFWS 1983) in other systems.

5.2.3 Fisheries and Nonnative Introductions

Commercial fishing was a historically important part of Utah Lake, but has gradually decreased since the 1950s. Commercial fishing was a significant factor in the extirpation of the Bonneville cutthroat trout (*Oncorhynchus clarki utah*) from Utah Lake, and resulted in large numbers of suckers being harvested (Heckmann et al. 1981). Today, June sucker cannot be taken commercially and fishing is no longer considered a threat to the species. Introductions of nonnative fish species into Utah Lake, which began in the late 1800s, have resulted in a change of the lake's fish community. June sucker, Utah sucker (*Catostomus ardens*), Bonneville cutthroat trout, and Utah chub (*Gila atraria*) were historically the predominant native fish found in Utah Lake. Of these, only the June and Utah suckers remain in Utah Lake today.

Twenty-four fish species have been introduced into Utah Lake. Those which were particularly successful include carp (*Cyprinus carpio*) (1886), channel catfish (*Ictalurus punctatus*) (1919), black bullhead (*Ameiurus melas*) (1893), largemouth bass (*Micropterus salmoides*) (1890), walleye (1952), and white bass (1956). These species play a prominent role in the sport fishery today. Smallmouth bass, introduced into Deer Creek Reservoir in 1987, were recently collected in the lower Provo River and are expected to migrate downstream to Utah Lake.

The introduction of nonnative fishes into Utah Lake has altered the Utah Lake food web. June sucker now face competition with and predation by a number of species. In addition, these introductions have contributed to water quality and habitat changes such as increased turbidity and a reduction in aquatic macrophytes. Loss of recruitment has resulted from a combination of the above factors. To increase natural recruitment of adult June sucker the JSRIP has investigated the potential for removing or reducing carp populations in Utah Lake. The results

of two studies indicated that it would be possible to reduce and control carp populations in the lake using mechanical harvest methods (SWCA 2005; SWCA 2006). By reducing the carp population, an increase in rooted aquatic vegetation may be achievable and thus result in increased refuge habitat for small June sucker.

5.2.4 Flood Plain Development

Increased urbanization along Utah Lake's tributaries has stimulated extensive flood and erosion control activities within river channels, and reduced available land for recreating historic river channel conditions. Channelization for flood control and additional channel manipulation for erosion control further reduce the total length of river for spawning and early life stage use. Coupled with changes in flow regimes, the quality and quantity of suitable spawning habitat available to June sucker is greatly reduced.

Habitat enhancements in the lower Provo River floodplain and other tributaries would benefit June sucker recovery. Enhancements should focus on re-establishing some historic conditions by increasing habitat complexity and providing appropriate physical and biological conditions necessary for egg hatching, larval development, growth, and young-of-the-year survival. Alternatives to implement some of these enhancements on the lower Provo River have been developed (Olsen et al. 2002), however the necessary funding and land to implement these enhancements have not been secured. By working with several partners, the JSRIP was successful in acquiring land along the lower reaches of Hobble Creek. With financial contributions from the Utah Transit Authority, the JSRIP was able to create additional wetland habitat and improve the interface between Utah Lake and Hobble Creek. This project was intended to provide low velocity, off channel habitat to optimize growth and survival of larval June sucker. While the Hobble Creek project is still relatively new, in 2009 approximately 100 June sucker were documented using the restored area during the spawning run.

6.0 Project Effects Analysis

Carp have been identified as the primary nonnative fish threat to June sucker. The proposed carp removal action would implement an important activity in the approved Recovery Plan for the June sucker, that of minimizing the impacts resulting from nonnative fish species in Utah Lake. The removal of carp would decrease substrate disturbance, resulting in increased rooted aquatic vegetation that provides critical cover from predators for early life stages of June sucker (Petersen 1996; Crowl et al. 1998a).

Mechanical carp removal may result in the incidental take of June sucker. The Service issued a Section 10 permit (USFWS 2009) authorizing the incidental take of ten June sucker per day during carp removal. Pilot studies of carp removal conducted on Utah Lake indicate very few June sucker were captured as incidental bycatch. Those captured were returned to Utah Lake with only a single mortality over a 6-month pilot period. This pilot study demonstrated that mechanical carp removal will result in less take than previously authorized by the Service. Gear types specifically designed to minimize the capture of June sucker will continue to be used and, for those that may be captured, crews and observers will remove June sucker from the nets and return them to the lake as quickly as possible. Observers on each boat will report on incidental take of June sucker to ensure compliance with the Service-issued Section 10 permit.

6.1 Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the Utah Lake ecosystem area considered in this BA. Future federal actions unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to ESA Section 7.

Utah Lake and the surrounding area have changed dramatically over the past 100 years, due to increased urbanization and changes in agricultural impacts. The area continues to see additional growth and development with much of the growth occurring in the Saratoga Springs area west of Utah Lake. Some of this growth has resulted in the conversion of agricultural land to subdivisions and housing developments and has also prompted transportation projects that will result in more roads being constructed in and around the project area. Some impacts related to this growth have been detrimental, including increased nutrient loading to Utah Lake, loss of wildlife and aquatic habitats, increased soil compaction, and loss of habitats around the lake due to urbanization and increased recreational use of facilities. Water development within the watershed has also resulted in changes in water quality and supply and the fluctuation of Utah Lake levels.

Recently there has been a general trend towards correction of past problems and marked efforts to restore and improve Utah Lake. The proposed action would contribute greatly to ongoing restoration efforts. Chief among these has been the elimination of untreated sewage discharges to the lake and the advances of modern treatment technologies which are standard in all urban communities around Utah Lake. The 2007 Utah Division of Water Quality "TMDL" study was an effort to identify and address all remaining water quality problems affecting Utah Lake, primarily phosphorus and salinity (UDWQ 2007).

The shift from agricultural to urban uses of Utah Lake water, primarily in the Salt Lake City area where most Utah Lake water is used, will result in reduced lake level fluctuations and reduced saline irrigation return flows to the lake. The completion of the Central Utah Project will further alter uses of Utah Lake water in a manner that will dampen lake fluctuations and may improve lake water quality. As discussed above, these actions should assist in improving the Utah Lake environment and June sucker recovery.

7.0 Conclusion and Determination of Effect

The Proposed Action will implement:

1) an important step in reducing the impact of nonnative species on June sucker;
2) use of gear types to avoid the incidental capture of June sucker;
3) use of observers to monitor incidental capture and return any June sucker captured to the lake;
4) monitoring of the action's effect on the Utah Lake fish community; and
5) practices consistent with JSRIP goals and objectives.

The JSRIP will continue to implement recovery actions outside of carp removal. These activities will include the possible restoration of tributary habitats, acquisition of water to benefit

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5) practices consistent with JSRIP goals and objectives.

The JSRIP will continue to implement recovery actions outside of carp removal. These activities will include the possible restoration of tributary habitats, acquisition of water to benefit

June sucker, and the continued stocking of June sucker from hatcheries and refuge populations.

The mechanical removal of carp, as described above will provide a net benefit to June sucker and the Utah Lake system. Incidental take of June sucker associated with mechanical carp removal has been authorized by a Section 10 permit (USFWS 2009) with a maximum take of ten June sucker per fishing day. June sucker avoidance strategies utilized in a pilot carp removal study have demonstrated that actual take of June sucker is much less than one per day. Therefore our determination of "may affect, and is likely to adversely affect" for the June sucker is warranted on a species level because individual June sucker could be taken incidental to the activity that will inevitably benefit the species. However, on a lake ecosystem level, it should be emphasized that the mechanical removal of carp, as described above will provide a net benefit to June sucker and the Utah Lake system.

8.0 References

Brimhill, H. W., and L. B. Merritt. 1981. Geology of Utah Lake: Implications for resource management. *Great Basin Naturalist Memoirs*, No. 5: Utah Lake Monograph. Provo, UT: Brigham Young University. 169 pp.

Crowl, T.A., L. Lentsch, and C. Keleher. 1998a. A synopsis of Provo River studies: instream flows and June sucker recovery (1995–1997). Final report submitted to BE, Provo, UT. 53 pp.

Crowl, T. A., H. M. Thomas, and D. Vinson. 1998b. June sucker and Utah Lake fisheries management studies: 1995–1997. Final report submitted to Utah Division of Wildlife Resources, Salt Lake City, UT and Central Utah Commission, Salt Lake City, UT. 112 pp.

Chumchal, M.M., W.H. Nowlin, and R.W. Drenner. 2005. Biomass dependent effects of common carp on water quality in shallow ponds. *Hydrobiologia* 545(1):271-277.

Eyring Research Institute, Inc. and Brigham Young University. 1982. Water quality, hydrology and aquatic biology of Utah Lake: WHAB Phase I Summary. Provo, UT: U.S. Bureau of Reclamation. 170 pp.

Fuhrman, D. K., L. B. Merritt, A. W. Miller, and H. S. Stock. 1981. Hydrology and water quality of Utah Lake. *Great Basin Naturalist Memoirs*, No. 5: Utah Lake Monograph. Provo, UT: Brigham Young University. 169 pp.

Heckmann, R. A., C. W. Thompson, and D. A. White. 1981. Fishes of Utah Lake. *Great Basin Naturalist Memoirs*, No. 5: Utah Lake Monograph. Provo, UT: Brigham Young University. 169 pp.

Keleher, C. J., L. D. Lentsch, and C. W. Thompson. 1998. Evaluation of flow requirements for June sucker (*Chasmistes liorus*) in the Provo River: An empirical approach. Pub. Number 99-06. Utah Division of Wildlife Resources. Salt Lake City,

Utah.

Modde, T. and N. Muirhead. 1990. Emergence patterns and feeding behavior of larval June sucker. Final Report. Utah Division of Wildlife Resources Contract 90-0081.

Olsen, D., T. Welker, P. Abate, and M. Stamp. 2002. June sucker habitat enhancement alternatives in the lower Provo River and its interface with Utah Lake. Final report submitted to June Sucker Implementation Program, Utah Department of Natural Resources. Salt Lake City, Utah. 78 pp.

Petersen, M. 1996. The effects of prey growth, physical structure, and piscivore electivity on the relative prey vulnerability of gizzard shad (*Dorosoma cepedianum*) and June sucker (*Chasmistes liorus*). Master of Science Thesis. Utah State University. Logan, UT.

Radant, R. D. and D. K. Sakaguchi. 1981. Utah Lake fisheries inventory. U.S. Bureau of Reclamation Contract 8-07-40-50634. Salt Lake City, Utah: Utah Division of Wildlife Resources. 244 pp.

Radant, R. D. and D. S. Shirley. 1987. June sucker—Utah Lake Investigations. U.S. Bureau of Reclamation Contract 8-07-40-S0634. Modification No. 5. Salt Lake City, Utah: Utah Division of Wildlife Resources. 46pp.

SWCA. 2005. Final Report: A Feasibility Study of Mechanical Control and use of Common Carp (*Cyprinus carpio*) on Utah Lake. Final Report to the June Sucker Recovery Implementation Program. SWCA Environmental Consultants. Albuquerque, New Mexico.

SWCA. 2006. Final Report: Population Assessment and Mechanical Control of Common Carp (*Cyprinus carpio*) in Utah Lake. Final Report to the June Sucker Recovery Implementation Program. SWCA Environmental Consultants. Albuquerque, New Mexico.

Utah Division of Water Quality (UDWQ). 2007. Utah Lake TMDL: Pollution Loading Assessment and Designated Beneficial Use Impairment Assessment. Utah Division of Water Quality. Salt Lake City, Utah.

Utah Division of Wildlife Resources. 2009. Monitoring trends in Utah Lake sucker populations and Utah Lake fish community monitoring. Final report to the June Sucker Recovery Implementation Program. 25 pp.

U.S. Fish and Wildlife Service. 1983. Cui-ui Recovery Plan (revision). Reno, Nevada.

_____. 1999. June sucker (*Chasmistes liorus*) Recovery Plan. U.S. Fish and Wildlife Service, Denver, Colorado. 61 pp.

_____. 2002. Final Environmental Assessment on the June sucker Recovery Implementation Program and Finding of No Significant Impact. U.S. Fish and Wildlife Service, Utah Field Office, Salt Lake City, Utah.

_____. 2009. Utah Division of Wildlife Resources Federal Fish and Wildlife Permit. U.S. Fish and Wildlife Service, Denver, Colorado.

APPENDIX C: INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM – REGION 6

Intra-Service Section 7 Biological Evaluation Form - Region 6

Originating Person: Kevin Sloan Date Submitted: January 22, 2010

Telephone Number: 303 236 4404

I. **Service Program and Geographic Area or Station Name:** Wildlife and Sport Fish Restoration (R6)

II. **Flexible Funding Program:** State Wildlife Grant Program

III. **Location:** Utah Lake lies west of Provo, Utah, and at 96,000 surface acres, is one of the largest natural freshwater lakes in the western United States (Figure 1). It is 38 km (23.6 mi) long and 21 km (13 mi) wide, and is at an elevation of about 1,368 m (4,489 ft). The lake is relatively shallow, having an average depth of 2.8 m (9.2 ft) and maximum depth of 4.2 m (13.8 ft). The lake is the terminus for the Provo, Spanish Fork, and American Fork rivers. The outflow of Utah Lake is the Jordan River, which flows 65 km (45 mi) north into the Great Salt Lake, a terminal basin.

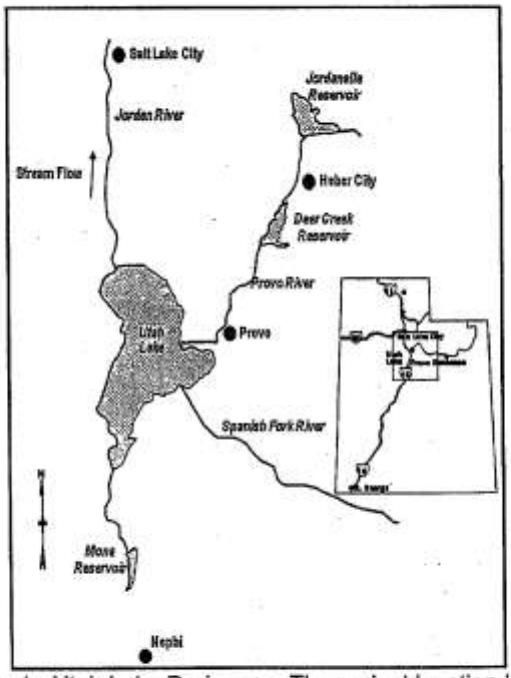

Figure 1: Utah Lake Drainage – The project location is Utah Lake.

IV **Species/Critical Habitat**: June sucker (*Chasmistes liorus*): The June sucker is a lakesucker endemic to Utah Lake. It exists naturally only in Utah Lake and spawns primarily in the Provo River. The June sucker was federally listed as an endangered species with critical habitat on April 30, 1986 (51 FR 10857). Designated critical habitat occurs along the lower 4.9 miles of the Provo River. The listing was due to its localized distribution, failure to recruit new adult fish, and threats to its continued survival.

V. Project Description: Commercial fishing operations would use boats, large nets (primarily seines) and hand labor to capture and remove about five million pounds of common carp annually from Utah Lake over a six year period. The use of trapping, electricity, trawling, or baiting may also be used in specific, localized situations such as tributaries, canals, near shore areas or other areas where larger seines cannot be effectively deployed. Carp would be transported to various existing access locations around the lake for offloading and disposal outside of the lake environment.

The June Sucker Recovery Implementation Program would contract with commercial fishing operations to remove common carp through fishing methods approved by the Utah Division of Wildlife Resources (UDWR). Fishing operations are proposed to occur for at least 120 days per year primarily from September to April, the time of year earlier pilot efforts have indicated are most effective for carp removal. Activities may extend outside these times if conditions are favorable and if needed to meet the annual removal target of five million pounds of carp.

Two to three fishing crews operating boats for fishing and transport of catch would be employed in this effort. A crew would typically consist of four to five people in three boats. Two boats are necessary for efficient seining, while the third boat would be used for transport. Between 10 and 20 boatloads of carp per day would move from open water to offloading points around the lake in order to catch and remove a target of at least 46,000 pounds of carp per day over the 120-day period. All commercial fishing operations are required to comply with the State of Utah's regulations relating to the commercial harvest of fish, including the acquisition of appropriate permits and certificates of registration.

Fishing may take place during winter conditions when ice cover is present on Utah Lake. Winter fishing would typically involve one to two crews, each consisting of five to eight people working on top of the ice. Nets would be deployed through a series of 50 to 70 holes (2 ft by 2 ft) in the ice and retrieved to a large "take-out" hole (10 ft by 5 ft). Fish are removed through the "take-out" hole and transported to the shore by trailer.

Facility improvements and construction may be necessary to facilitate the offloading of fish from fishing boats. At this time the location, design, and necessity of this construction is unclear and therefore it will not be considered in the current consultation. Consultation will be initiated prior to the construction of any facilities associated with the carp removal project.

VI. **Determination of Effects:**

(A) Description of Effects: Carp have been identified as the primary nonnative fish threat to June sucker. The proposed carp removal action would implement an important activity in the approved Recovery Plan for the June sucker, that of minimizing the impacts resulting from nonnative fish species in Utah Lake. The removal of carp would decrease substrate disturbance, resulting in increased rooted aquatic vegetation that provides critical cover from predators for early life stages of June sucker.

Mechanical carp removal may result in the incidental take of June sucker. The Service issued a Section 10 permit (USFWS 2009) authorizing the incidental take of ten June sucker per day during carp removal. Pilot studies of carp removal conducted on Utah Lake indicate very few June sucker were captured as incidental bycatch. Those captured were returned to Utah Lake with only a single mortality over a 6-month pilot period. This pilot study demonstrated that mechanical carp removal will result in less take than previously authorized by the Service. Gear types specifically designed to minimize the capture of June sucker will continue to be used and, for those that may be captured, crews and observers will remove June sucker from the nets and return them to the lake as quickly as possible. Observers on each boat will report on incidental take of June sucker to ensure compliance with the Service issued Section 10 permit.

(B) Determination: Determine the anticipated effects of the proposed project on species and critical habitats listed in item IV. Check all applicable boxes and list the species (or attach a list) associated with each determination.

Determination

No Effect: This determination is appropriate when the proposed project will not directly or indirectly affect (neither negatively nor beneficially) individuals of listed/proposed/candidate species or designated/proposed critical habitat of such species. No concurrence from ESFO required. ———

May Affect but Not Likely to Adversely Affect: This determination is appropriate when the proposed project is likely to cause insignificant, discountable, or wholly beneficial effects to individuals and designated critical habitat. **Consultation with ESFO required.** ———

May Affect and Likely to Adversely Affect: This determination is appropriate when the proposed project is likely to adversely impact individuals of listed species or designated critical habitat of such species. **Consultation with ESFO required.** X

Not Likely to Jeopardize candidate or proposed species/critical habitat: This determination is appropriate when the proposed project is not expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. **Consultation with ESFO required.** ———

Likely to Jeopardize candidate or proposed species/critical habitat: ____
This determination is appropriate when the proposed project is reasonably expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. **Consultation with ESFO required.**

Signature _____ Date 1/26/10

Reviewing Ecological Services Office Evaluation (check all that apply):

A. **Concurrence** _____ **Nonconcurrence** _____
Explanation for nonconcurrence:

B. Formal consultation required __x__

Further consultation is not required as the effects to June sucker were analyzed and incidental take has been covered under a Section 10 permit (TE047266-2) issued May 14, 2009.

C. Conference required _____
List species or critical habitat unit

Name of Reviewing ES Office Utah Field Office

Signature _____ Date 1/25/2010

APPENDIX D: FEDERAL FISH AND WILDLIFE PERMIT

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

3-201
(1/77)

FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY STATUTES
16 USC 1539(a)
16 USC 1533(d)
16 USC 703-712

REGULATIONS (Attached)
50 CFR 17.22
50 CFR 17.32
50 CFR 21.23 & 21.27
50 CFR 13

1. PERMITTEE

UTAH DIVISION OF WILDLIFE RESOURCES
DEPARTMENT OF NATURAL RESOURCES
P.O. BOX 146301
SALT LAKE CITY, UT 84114-6301
U.S.A.

3. NUMBER
TE047266-2 AMENDMENT

4. RENEWABLE
[X] YES
[ ] NO

5. MAY COPY
[X] YES
[ ] NO

6. EFFECTIVE
05/14/2009

7. EXPIRES
12/31/2012

8. NAME AND TITLE OF PRINCIPAL OFFICER (If it is a business)
JIM KARPOWITZ
DIRECTOR

9. TYPE OF PERMIT
THREATENED AND ENDANGERED SPECIES

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
ON LANDS SPECIFIED WITHIN THE ATTACHED SPECIAL TERMS AND CONDITIONS

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

D. Further conditions of authorization are contained in the attached Special Terms and Conditions.

Species Permitted:
Black-footed ferret - endangered
Bonytail - endangered
Canada lynx - threatened
Colorado pikeminnow - endangered
Desert tortoise - threatened
Gray wolf - endangered
Humpback chub - endangered
June sucker - endangered
Mexican spotted owl - threatened
Razorback sucker - endangered
Southwestern willow flycatcher - endangered
Utah prairie dog - threatened

[X] ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS
ANNUAL REPORT DUE: 3/31

ISSUED BY	TITLE	DATE
	DEPUTY ARD - ECOLOGICAL SERVICES	05/14/2009

Virgin River chub - endangered
Woundfin - endangered

Clay reed-mustard - threatened
Dwarf bear-poppy - threatened
Deseret milk-vetch - threatened
Holmgren milk-vetch - endangered
Shivwits milk-vetch - endangered
Shrubby reed-mustard - endangered
Uinta Basin hookless cactus - threatened
Ute ladies'-tresses - threatened

SPECIAL TERMS AND CONDITIONS FOR
Utah Division of Wildlife Resources

Species: **Black-footed ferret** *(Mustela nigripes)*
Bonytail *(Gila elegans)*
Canada lynx *(Lynx canadensis)*
Colorado pikeminnow *(Ptychocheilus lucius)*
Desert tortoise *(Gopherus agassizii)*
Gray wolf (*Canis lupus*)
Humpback chub *(Gila cypha)*
June sucker *(Chasmistes liorus)*
Mexican spotted owl *(Strix occidentalis lucida)*
Razorback sucker *(Xyrauchen texanus)*
Southwestern willow flycatcher *(Empidonax traillii extimus)*
Utah prairie dog *(Cynomys parvidens)*
Virgin River chub *(Gila robusta seminuda)*
Woundfin *(Plagopterus argentissimus)*
Dwarf bear-poppy *(Arctomecon humilis)*
Shivwits milk-vetch *(Astragalus ampullarioides)*
Deseret Milk-vetch *(Astragalus desereticus)*
Holmgren milk-vetch *(Astragalus holmgreniorum)*
Siler pincushion cactus *(Pediocactus sileri)*
Clay reed-mustard *(Schoenocrambe argillacea)*
Shrubby reed-mustard *(Schoenocrambe suffrutescens)*
Uinta Basin hookless cactus *(Sclerocactus glaucus)*
Ute ladies'-tresses *(Spiranthes diluvialis)*

This amendment changes the annual report due date to March 31 of each year. This permit authorizes the following activities in Utah, through December 31, 2012, to enhance recovery, survival, propagation, and scientific research under the following conditions:

E. The person named in box 8 on the face of this permit is responsible to ensure that the activities of all individuals are in compliance with the terms and conditions of this permit. Only individuals on the attached List of Authorized Individuals are approved to conduct activities pursuant to this permit.

F. All activities in Utah are authorized pending prior specific concurrence from the U.S. Fish and Wildlife Service (Service), Project Leader, Ecological Services, 2369 West Orton Circle, West Valley City, Utah 84119, telephone 801-975-3330 or the Utah Division of Wildlife Resources (UDWR), Assistant Project Leader, Utah State Office, 1594 West North Temple, Salt Lake City, Utah 84114, telephone 801-538-4700.

G. **Black-footed ferret**

1. Permittee is authorized to spotlight survey, live trap, anesthetize, implant Passive Integrated Transponder (PIT) tags, collect approximately 30 hairs, and scrape cells from inside of cheeks for genetic analysis. Only licensed project veterinarians or personnel who have successfully completed Service-sponsored ferret anesthesia training are authorized to anesthetize black-footed ferrets.

2. Permittee shall adhere to all provisions and conditions specified through annual Service black-footed ferret allocation processes with respect to the transportation, translocation, reintroduction, and handling of black-footed ferrets to and within approved reintroduction sites.

3. No black-footed ferrets born or found in the wild (previously reintroduced) shall be translocated to new locations or otherwise removed from the wild without prior approval of the Recovery Coordinator (see attached list).

4. No black-footed ferrets or biological samples from black-footed ferrets shall be released from the custody of the permittee to other parties without prior authorization from the Recovery Coordinator (see attached list).

5. Permittee shall report immediately any debilitating injuries or death(s) of black-footed ferrets to the office of the Recovery Coordinator (see attached list).

6. Permittee is authorized to collect hair and cheek cells for genetic analysis. Animals must be anesthetized by project veterinarians or personnel who have successfully completed Service-sponsored ferret anesthesia training are authorized to anesthetize black-footed ferrets. No samples collected from black-footed ferrets shall be released from the custody of the permittee to other parties without prior authorization from the Recovery Coordinator (see attached list).

7. The allotted amount of mortalities authorized by this permit is 1 black-footed ferret. In the event that more than the allotted mortalities occur, permitted activities must immediately cease. The Project Leader and the Resident Agent in Charge (see attached list) **must** be contacted within 24 hours. The Project Leader must give approval before permitted activities may begin again. Disposition of mortalities will be at the direction of the Project Leader.

H. **Bonytail, Colorado pikeminnow, Humpback chub, Razorback sucker**

1. Permittee is authorized to capture (using seines, trap nets, trammel nets, and electrofishing), weigh, measure, PIT tag, and release juvenile and adult federally listed fishes (as listed above) in the Colorado River, Green River, San Juan River, Lake Powell, and all associated tributaries.

a. Electrofishing equipment shall be calibrated each year under controlled laboratory conditions, such as may be found in an electrical engineering department of a State university. Wave forms shall be measured to ensure that spiked wave forms are not being produced and that no reversal of polarity is being encountered.

b. Only persons with field or formal training in electrofishing methods and one or more field seasons of experience are authorized to use this method.

c. Electrofishing is authorized using DC only. If pulsed DC is used, rectangular wave forms at pulse frequencies of 40 pulses per second or less shall be used. Before sampling for endangered fish, electrofishing equipment shall be calibrated by taking non-endangered fishes. This calibration shall be done in water having the same conductivity and temperature as the water which shall be surveyed for endangered fishes. When non-endangered fish (e.g., minnows, carp, suckers, or game fish) are taken, the voltage and current should be recorded and not increased during the sampling period.

d. Daily records of water conductivity, temperature, voltage and amperes, and wave form shall be kept and provided in your annual report. Voltage measurements and current should specify whether peak voltage, average voltage, or RMS voltage is being recorded. Electrofishing should be restricted to waters in which conductivity measures less than 1,000 micromohs per cm^2.

e. Electrofishing over any known spawning bars is prohibited unless specifically called for in an Upper Colorado River Endangered Fish Recovery Program (Recovery Program) approved Scope of Work.

f. Lethal take in the amount of 6 individuals ($\geq$ 150 mm total length; endangered species in the aggregate) due to electrofishing mortality total is permitted annually. At any point in the year, if this annual take limit is exceeded UDWR must contact the Service prior to resuming field activities to seek additional, temporary take coverage. Field procedures and /or this acceptable level of take shall be reviewed by the Service and UDWR and revised as necessary before permit renewal in the future.

2. Permittee is authorized to capture, weigh, measure, and hold wild bonytail, humpback chubs, razorback sucker, and Colorado pikeminnow taken from the Colorado River, Green River, San Juan River, Lake Powell, and all associated tributaries.

a. Permittee is authorized to hold and transport live endangered fish captured in the wild according to the provisions and procedures outlined in the protocol. Protocol shall be obtained at http://www.fws.gov/mountain-prairie/endspp/protocols/protocols.html.

b. Bonytail and razorback suckers shall be stocked according to the Integrated Stocking Plan.

3. Permittee is authorized to collect (using drift nets and seines) larvae and young-of-the-year bonytail, Colorado pikeminnow, humpback chub, and razorback suckers in the Green River, Colorado River, San Juan River, Lake Powell, and all associated tributaries.

a. Every effort shall be made to prevent mortality. Only those young-of-the-year fishes that cannot be identified accurately in the field and larval razorback sucker captured in the approved Program studies may be sacrificed. All other fish shall be released as soon as possible at the point of capture. Fish that were sacrificed shall be preserved for accurate identification and shall be provided to the Larval Fish Laboratory, Colorado State University (see attached list), or the U.S. Geological Survey-Biological Resources (USGS-BRD) (see attached list) for curation and maintenance. The number of young-of-the-year of each species taken, the site from which they were taken, and the site of deposition for these specimens shall be reported annually.

b. Lethal take of young endangered fish (< 150 mm TL) shall not exceed 10% of the total number of young endangered fish collected on an annual basis. If this annual take limit is exceeded field procedures and/or this acceptable level of take shall be reviewed by the Service and UDWR and revised as necessary before permit renewal in the future.

4. Permittee is authorized to transport, hold, propagate, and stock razorback suckers taken from the Green River, Colorado River, San Juan River, Lake Powell, and all associated tributaries into ponds and facilities managed and maintained by the UDWR located at the Wahweap State Fish Hatchery, Big Water, Utah. In the annual permit report, UDWR shall summarize endangered fish production, characterizing expected and unexpected mortality throughout the year. If any cohort of endangered fish experiences significant, unexpected rates of mortality, the Director (see attached list) shall be notified immediately.

5. Permittee is authorized to transport, hold, and propagate humpback chubs, if directed by the Recovery Program, taken from the Green River and Colorado River into ponds and facilities managed and maintained by the UDWR located at the Wahweap State Fish Hatchery, Big Water, Utah.

6. Permittee is authorized to transfer, hold, propagate, and stock bonytail originally obtained from Dexter National Fish Hatchery into ponds and facilities managed and maintained by the UDWR located at the Wahweap State Fish Hatchery, Big Water, Utah. All bonytail shall be PIT tagged prior to release.

7. UDWR hatchery personnel are permitted to transport and display in aquaria small numbers (<50) of hatchery-reared, endangered Colorado River fish from their Wahweap facility for educational purposed. UDWR is permitted to maintain Colorado River fish is educational display aquaria at up to 6 locations throughout Utah. If mortality in the aquaria exceeds that expected to occur at the Wahweap facility, UDWR will contact the Project Leader (see attached list) and will re-evaluate this activity.

8. Efforts shall be made to prevent loss of any specimens during capture. Any bonytail chub or humpback chub taken incidentally (i.e., accidentally killed) during capture and handling shall be preserved for taxonomic research. Juvenile and adult specimens of all species taken incidentally shall be provided to the USGS-BRD (see attached list) for curation and maintenance unless otherwise advised by the Director of the Recovery Program (see attached list).

9. Permittee is authorized to take Colorado River fish according to the following instructions:

   a. Euthanization as necessary of all deformed bonytail raised in captivity with a lethal dose of MS-222.

   b. Up to 60 bonytail may be taken for the purpose of disease certification. Disposition of the carcasses will be determined by the Service and may include: research needs, museum collections, University collections, or disposal

   c. Prior to transfer of bonytail from captivity to the wild, up to 20 individual bonytail may be sacrificed to determine overall health and condition profile. UDWR personnel will coordinate with the State pathologist to conduct health and condition profile at the same time as disease certification to reduce with number of bonytail sacrificed.

10. In the event of a fish mortality/morbidity event (fish kill), UDWR personnel are permitted to collect dead or dying bonytail Colorado pikeminnow, humpback chub, and razorback sucker to submit the carcasses for further assessments. In such an event, the Project Leader (see attached list) shall be contacted immediately.

11. The allotted amount of incidental mortalities authorized by this permit is 50 total Colorado River fish. In the event that more than the allotted mortalities occur, permitted activities must immediately cease. The Project Leader and the Resident

Agent in Charge (see attached list) **must** be contacted within 24 hours. The Project Leader must give approval before permitted activities may begin again. Disposition of mortalities will be at the direction of the Project Leader.

I. **Canada lynx**

1. All handling and management efforts conducted with lynx must be coordinated with the Project Leader (see attached list) prior to any on-the-ground activities to ensure that all actions are consistent with recovery and reintroduction goals.

2. Following coordination with aforementioned contacts, UDWR may handle threatened lynx by capturing lynx using three methods (only with appropriate approvals prior to each capturing event): padded leg-hold traps, or box traps, or with use of hounds.

   a. Lynx shall be anesthetized to conduct an on-site health examination, including blood or DNA samples.

   b. Captured lynx shall be released on site or translocated.

   c. Any unmarked lynx translocation activity must be coordinated and approved by the Project Leader (see attached list) prior to activity initiation.

   d. Translocation of any marked lynx from Colorado must be coordinated and approved by the Project Leaders in both Utah and the Colorado (Grand Junction) prior to activity initiation.

   e. Lynx may be live-captured for research or management purposes in coordination with the Project Leader.

   f. Captured lynx shall be euthanized if sick, injured, diseased, or orphaned.

   g. Salvage a dead specimen for scientific study; and aid in law enforcement investigations.

   h. Collection/salvage of lynx parts/specimens (hides, skulls, etc.) may be used for scientific and educational purposes after consultation and concurrence from Service law enforcement agents.

3. Management activities (as identified above) shall be coordinated with the Project Leader in Utah (see attached list). Any translocations of known Colorado-marked lynx must also be coordinated with the Project Leader in Colorado (see attached list).

4. The allotted amount of mortalities authorized by this permit is 1 Canada lynx. In the event that more than the allotted mortalities occur, permitted activities must immediately cease. The Project Leader and the Resident Agent in Charge (see attached list) **must** be contacted within 24 hours. The Project Leader must give approval before permitted activities may begin again. Disposition of mortalities will be at the direction of the Project Leader.

J. **Desert tortoise**

1. Permittee is authorized to collect intact desert tortoise remains within incidental take areas or surrounding urbanized areas in Washington County, Utah. Remains of shells that are thinned and deteriorated or fragmented by weathering shall be left where they are found.

   a. Desert tortoise shells that are obtained during management activities in Washington County shall be stored and maintained at the UDWR Washington County Field Office in St. George, Utah, for education and research purposes.

   b. Shells and other remains with a known locality (e.g., UTM coordinate) are to be catalogued, kept intact, and made available to research personnel for use as reference material or for other uses that shall enhance survival and conservation of the desert tortoise. The majority of remains shall be transferred to the University of Utah Natural History Museum, Salt Lake City to be added to their permanent collections.

2. All permittees conducting desert tortoise presence/absence surveys, clearance surveys, or handling live tortoises must have training from a qualified desert tortoise biologist prior to engaging in the aforementioned activities. Qualified desert tortoise biologists will have a bachelor's degree or graduate degree in biology, ecology, wildlife biology, herpetology, or related fields. The biologist must have demonstrated prior field experience using accepted resource agency technique to survey for desert tortoises. Field experience means a minimum of 60 days field experience searching for desert tortoises and tortoise sign. In addition, the surveyor should have the following qualifications for the survey results to be accepted by the Service: 1) ability to recognize and accurately identify all types of desert tortoise sign, and 2) ability to carefully, legibly, and completely record all sign including scat, size of shelter sites, shells, and estimated size of live tortoises.

3. Permittee is authorized to collect, measure, permanently mark, and transfer to Washington County Habitat Conservation Plan (WCHCP) administration displaced desert tortoises to fulfill incidental take obligations under the WCHCP.

Displaced tortoises from incidental take areas or adjacent urbanization areas that are determined to be disease-free may be translocated to Management Zone 4, Red Cliffs Desert Reserve (RCDR), Washington County, Utah, or other locations approved by the Project Leader (see attached list).

4. Tortoises temporarily held in captivity that were taken from a known site in Washington County and that are determined to be disease-free may be returned to the specific collection site.

5. Tortoises already in captivity that were taken from the wild in another State may be returned to the State of origin.

6. Permittee is authorized to euthanize tortoises already in captivity provided that a veterinarian designated by the Service determines that the tortoise is terminally ill and cannot be placed or used for any purposes that would enhance the conservation, survival, or scientific knowledge of this species. Prior to euthanizing, the Project Leader (see attached list) must be contacted.

7. Desert tortoises already in captivity may remain in captivity (eligible for educational purposes or for captive adoption program) or placed under foster care outside of Washington, Kane, or Iron Counties provided that one or more of the following conditions are met:

   a. Tortoise origin is known as wild but has been held in captivity for a period long enough to likely prevent survival in the wild, i.e., typically 2-6 months.

   b. The tortoise's behavior is so altered it cannot be returned to the wild. Such behavior includes: familiarity with humans and/or domestic pets, scutes exhibit a "pyramid" effect due to over-nutrition, overly long claws or "club feet," or unnatural markings such as paint or hole drilled into the carapace.

   c. The tortoise has been exposed to diseases that have the potential to negatively affect the wild population.

   d. Tortoises must be permanently marked, e.g., PIT tag, notched scutes, etc., prior to placement.

   e. Educational programs must provide oral or written text information on the tortoises' ecological role, its threatened status under the Endangered Species Act, threats to its existence, and conservation needs.

   f. Tortoise has been held in captivity for a period long enough to likely prevent survival in the wild (typically 2-6 months).

8. Permittee is authorized to capture, measure, mark, affix radio transmitters (when appropriate), and release desert tortoises in RCDR to fulfill monitoring obligations under the WCHCP and Desert Tortoise (Mojave Population) Recovery Plan and in accordance with the Guidelines for Handling Desert Tortoises.

9. Permittee is authorized to handle desert tortoises if necessary to move desert tortoises and/or their eggs (burrow excavation and surface removal) out of harm's way. If within the RCDR, any activities must be coordinated with the WCHCP Administration. Outside of the RCDR, handling of tortoises and/or their eggs out of harm's way may occur prior to construction, surface disturbance, or emergency situations (including fire or other unforeseen circumstances). These circumstances include:

   a. Clearance of tortoises or eggs in designated "take" areas identified in the WCHCP;

   b. Clearance of tortoises or eggs in "potential habitat" areas as in identified in the WCHCP;

   c. Animals reported or discovered on lands immediately adjacent to the RCDR boundary and deemed to have breeched the reserve fencing;

   e. Animals reported or discovered outside the RCDR in otherwise unidentified areas in Washington County (origin unknown).

   f. Animals brought to the UDWR Field Office from outside Washington County.

10. Tortoises shall be moved to one of the following destinations (other destinations shall be authorized by the Service):

   a. Tortoises appearing injured may be taken to a qualified veterinarian;

   b. Tortoises placed in the temporary holding facility if disposition determined to be sick with Upper Respiratory Tract Disease, wild origin, or unknown;

   c. Tortoises transferred to UDWR if determined to be captive animals or animals that have breached the reserve fencing (if so directed by UDWR, breached animals may be put back into the RCDR).

11. Tortoise eggs shall be moved to the following destinations (other destinations need Service authorization):

a. If in the RCDR, eggs to be moved to another location in the RCDR per Desert tortoise Council Handling Guidelines (Desert Tortoise Council 1994, revised 1999);

b. If outside the RCDR, eggs to be relocated to the temporary care holding facilities and placed in the ground per the Desert tortoise Council Handling Guidelines (Desert Tortoise Council 1994, revised 1999).

12. When handling desert tortoise(s) and/or their eggs:

a. The desert tortoises shall be handled in a careful manner which includes: a) lifting slowly and fully supporting in an upright position at all times; b) handling shall be conducted wearing new surgical gloves to avoid passage of contamination between the animals and humans or between individual animals.

b. Tortoises shall not be restrained, confined, molested, or injured in the field during movement.

c. If tortoises need to be transported, placement in a clean box as soon as possible for transportation. Temperatures must be kept below 90°F. Tortoises shall never be left unattended in vehicles.

d. Nests shall be excavated and eggs removed and relocated as per the Desert tortoise Council Handling Guidelines (Desert Tortoise Council 1994, revised 1999).

e. You must notify the Service of status of the translocated eggs (successful hatching, partial hatching, or unsuccessful hatching).

13. Desert tortoises may be salvaged if they exhibit one or more of the following:

a. Colored and purulent nasal or ocular discharge, ocular edema or drainage, incrusted mucus.

b. Moderate to severe epidermal shell or epidermal and bond lesions in immature or adult tortoises.

c. Exhibits muscle wasting (cachexia).

d. Partial or complete paralysis, inability to stand or hold head up and alert (postures typical of severely debilitated or dying animals), inability to move about normally or to retract into shell or respond to typical human stimuli.

e. Sloughing of scutes that are not part of a healing process.

f. Exposed and necrotic bone.

g. Abnormally light weight with other accompanying signs or disease.

h. Inappropriate activity and behavior of time of day and season with other accompanying signs of disease.

14. Salvage priority for tortoises must meet at least one criterion above before salvage may occur.

a. Individual tortoises meeting the criteria for salvage located in areas exhibiting high rates of adult tortoise mortality (e.g., Management Zone 3) within the RCDR.

b. Individuals meeting the criteria for salvage located in Zones 2 and 5 of the RCDR.

c. Individuals exhibiting signs of illness potentially associated with prolonged drought located within the RCDR.

15. Tortoises collected for necropsy shall be handled according the procedures identified by the lab conducting the analysis to ensure the ability to obtain the most relevant data.

16. Information regarding location of collection, condition of tortoise at collection, and any results obtained through necropsy and analysis of collected animals must be provided to the Project Leader (see attached list) and in the annual reports.

17. All animals displaying signs of disease or severe injury may be euthanized by a qualified veterinarian. Otherwise, no desert tortoise mortalities are authorized by this permit as a result of permitted activities. In the event that more than the allotted mortalities occur, permitted activities must immediately cease. The Project Leader and the Resident Agent in Charge (see attached list) **must** be contacted within 24 hours. The Project Leader must give approval before permitted activities may begin again. Disposition of mortalities will be at the direction of the Project Leader.

J. **June sucker**

1. Permittee is authorized to capture June suckers using seines, trawling, trap nets, dipnets, minnow traps, electrofishing, cast nets, light traps, drift nets, electrofishing, and gill nets and trammel nets which shall be attended at all times. (Trap nets are usually set for a 24-hour period, pulled, fish worked up and

sometimes reset. Light traps are usually set at dusk and pulled prior to dawn. Trap nets and light traps are not usually attended at all times.) Permittee is also authorized to collect fertilized eggs via artificial spawning on Provo River transferred to Rosebud Ponds (Camp Creek populations) or Fisheries Experiment Station (FES), Logan, Utah.

2. Permittee shall collect data using standard measurements; length, weight, capture location, etc.; pit tag, fin clip or mark, and tag; collect tissue samples of up to 30 specimens from each cohort of propagated fish at FES for genetic analysis, as determined necessary by the Recovery Program and the Service.

3. Permittee is authorized to propagate June suckers at the FES in Logan, Utah. Authorized propagation activities include: artificially spawn June sucker on the Provo River or at FES and culture eggs and larvae to required adult stages for reintroduction.

4. Permittee is authorized to transport fertilize eggs from Provo River and Rosebud Ponds to the FES in aerated, iced coolers; transport juvenile and adults by standard fish hauling methods in aerated fish tanks. The locations of transportation include: Utah Lake, the Millville Pond Complex (Cache County); Rosebud Ponds (Weber County); Camp Creek Reservoir (Box Elder County); Red Butte Reservoir (Salt Lake County); Mona Reservoir (Juab County); UDWR Fish Hatchery at Springville, (Utah County); and other sites in Utah mutually agreed to by UDWR and the Service.

5. Permittee is authorized to introduce June suckers in the Provo River, Utah Lake, Mona Reservoir, Millville Ponds, UDWR Fish Hatchery at Springville, Rosebud Ponds, Camp Creek Reservoir, and Red Butte Reservoir.

6. Permittee is authorized to take June suckers under the following conditions:

   a. Euthanization: as necessary of deformed June suckers being held/raised in captivity, preferably with a lethal dose of MS-222.

   b. Disease certification: 60 individual June sucker from Red Butte Reservoir, Camp Creek Reservoir, Mona Reservoir, Rosebud Ponds, Springville Hatchery, and FES. Any take should be reported within 24 hours to the Service. Disposition of the carcasses shall be determined by the Service and may include: research needs, museum collections, University collections, or disposal.

   c. Health Condition Profile: prior to transfer of June sucker from captivity to Utah Lake, 20 individual June sucker shall be sacrificed to determine overall health and condition (OHC). UDWR personnel shall coordinate with State pathologist to conduct OHC at the same time as Disease Certification to reduce the number of suckers needing to be sacrificed.

d. Incidental take of June sucker associated with using large-scale commercial fishing methods to reduce the carp population in Utah Lake: Reducing the carp population in Utah Lake and maintaining it at reduced levels is an action that has been identified as necessary to recover June sucker and, as a partner to the June Sucker Recovery Implementation Program and under their authority, UDWR shall grant permits for the large-scale harvest of carp from Utah Lake. Incidental take may occur as a result of harvest methods, although no June sucker mortalities have been observed during pilot study efforts. Incidental take shall be minimized by using gear types that minimize June sucker capture (i.e., seine mesh sized to capture deep-bodied carp but allow narrow-bodied June sucker to pass through), limiting harvest efforts to areas outside of where June sucker are known to congregate, and removing June sucker from the catch as soon as they are observed. The current augmentation of the Utah Lake June sucker population from culture and refuge facilities (> 30,000 individuals per year are stocked into the lake) shall more than offset any incidental take associated with large-scale harvest. The June sucker population and the Utah Lake fish community shall be monitored on an annual basis to track the effect of harvest efforts. Harvesters shall be required to provide annual reports of their harvest. UDWR biologists shall accompany harvesters on a routine basis to inspect their operations and collect data pertinent to June sucker recovery. The Service shall be notified of incidental June sucker mortalities associated with commercial harvest within 24 hours.

7. In the event of a fish mortality/morbidity event (fish kill), UDWR personnel are permitted to collect dead or dying June sucker to submit the carcasses for further assessments. In such an event, the Project Leader (see attached list) shall be contacted immediately.

8. The allotted amount of mortalities of June sucker authorized by this permit is dependent on the activity: 1) Monitoring – 5 per monitoring season; 2) Commercial harvest with carp removal program – 10 per day; 3) Hatchery program for augmentation – The hatchery program is involved in egg fertilization and raising June sucker to a stocking size of 8 inches. Immature stage losses of 50% from fertilized egg to larvae feeding stages is normal. Losses that exceed normal hatchery operations from fertilized egg to stocking size should be reported. Transportation – related mortality cannot exceed 10% loss. In the event that more than the allotted mortalities occur, permitted activities must immediately cease. The Project Leader and the Resident Agent in Charge (see attached list) **must** be contacted within 24 hours. The Project Leader must give approval before permitted activities may begin again. Disposition of mortalities will be at the direction of the Project Leader.

K. **Mexican spotted owl**

1. Permittee(s) is authorized to conduct surveys for the Mexican spotted owl as directed by approved protocol. Protocol shall be obtained at http://www.fws.gov/mountain-prairie/endspp/protocols/protocols.html.

   a. All permittees conducting surveys for Mexican spotted owls must have at least 1 year of experience, or be accompanied by permitted personnel who have 1 year or more of experience surveying, or attended a Service-approved Mexican spotted owl survey protocol training.

   b. Permission to use Mexican spotted owl calls to determine presence is contingent upon strict adherence to the established procedures found in the guidelines and must receive prior approval from the Project Leader (see attached list).

   c. Permittees are required to avoid calling Mexican spotted owls during periods of rain, snow, thunder, or in winds greater than 15 miles per hour.

   d. Permittees shall watch for and record aggression by known Mexican spotted owl predators including goshawks, red-tailed hawks, great horned owls, and golden eagles. Upon detecting aggressive behavior, surveys at the site of the incident shall be suspended for 24 hours, and contact the Project Leader (see attached list) within 24 hours.

   e. No mortality is authorized by this permit. In the event that any mortality occurs, all permitted activities must immediately cease. The Project Leader and the Resident Agent in Charge (see attached list) **must** be contacted within 24 hours. The Project Leader must give approval before permitted activities may begin again. Disposition of mortalities shall be at the direction of the Project Leader.

   f. This permit does not authorize the capture or handling of Mexican spotted owls during surveying activities, except in the case of dead or injured Mexican spotted owls encountered during surveys. Any injured Mexican spotted owl must be turned over to a licensed rehabilitator. Permittee is then required to notify the Project Leader (see attached list) within 24 hours. Any dead birds are to be properly preserved. Permittee shall contact the Project Leader within 5 days for disposition instructions.

   g. Collection of Mexican spotted owl feathers, eggs, and parts thereof is **not** authorized under this permit.

h. In addition to the annual reporting requirements, copies of all field data forms with positive survey results for Mexican spotted owls, with attached USGS 7.5 minute quadrangle maps clearly delineating all areas covered during each survey, should be submitted to the Project Leader (see attached list), by October 1 of each year.

2. Permittee is authorized to capture Mexican spotted owls using noose poles, Bal-Chatri traps, and mist nets, according to protocol. Bal-Chatri traps and mist nets must be monitored at all times.

3. Permittee is authorized to weigh, measure, radio tag, color band, and band adult Mexican spotted owls in Utah only. Banding, radio tagging, and handling of Mexican spotted owls shall be done by individuals that are experienced in banding and handling of this species.

a. Radio transmitters must not weigh more than 3% of the bird's body weight and may be attached to 2 retrix feathers of Mexican spotted owls captured for research studies.

b. Nestling Mexican spotted owls 20-35 days of age may be banded. Nests having younger or older nestlings shall not be disturbed. Mexican spotted owl nestlings shall be handled and returned to the nest as soon as possible.

c. Collections of feathers, addled eggs, carcasses, and parts thereof are authorized under the Migratory Bird Treaty Act. Disposition of these items shall be at the instruction of the Project Leader (see attached list), who shall coordinate with Law Enforcement personnel in the Regional Office. Eggshell fragments and addled eggs may be collected after nestlings have fledged for contaminant analysis.

4. A copy of documents reporting the findings of contaminant analysis conducted on eggshell fragments and addled eggs shall be sent to the Project Leader (see attached list).

L. **Southwestern willow flycatcher**

1. Permittee(s) are authorized to conduct presence/absence surveys for the Southwestern willow flycatcher according to the "Southwestern Willow Flycatcher Natural History Summary and Survey Protocol." Protocol shall be obtained at http://www.fws.gov/mountain-prairie/endspp/protocols/protocols.html. For more information about Southwestern willow flycatchers go to http://sbsc.wr.usgs.gov/cprs/research/projects/swwf/cprsmain.asp.

a. All permittees conducting surveys under this permit are required to complete one of the Southwestern willow flycatcher survey training seminars conducted by the Service, USGS-BRD, and State game and fish agencies prior to conducting any flycatcher surveys. Additionally, any permittees who have not conducted surveys with positive results for a couple of years are encouraged by the Service to attend another Southwestern willow flycatcher training seminar as a refresher course.

b. No mortality is approved for this permit. In the event that any mortality occurs, all permitted activities must immediately cease. The Project Leader and the Resident Agent in Charge (see attached list) **must** be contacted within 24 hours. The Project Leader must give approval before permitted activities may begin again. Disposition of mortalities shall be at the direction of the Project Leader.

c. You shall make reasonable efforts to determine if Southwestern willow flycatchers are marked with a silver aluminum band and/or color bands. If banded birds are sighted, you shall also make reasonable efforts to determine the band combination noting the number of bands, colors, and band location and sequence on the flycatcher's legs (e.g., red over yellow right leg/blue split pink over silver left leg).

d. If banded or unbanded Southwestern willow flycatchers are sighted during any survey period, contact the following personnel via e-mail within 24 hours:

Laura Romin ***Laura_Romin@fws.gov***

e. No capture, handling, banding, collecting of genetic materials (blood, tissues, feathers), nest monitoring, nest searching, or nest capturing of any Southwestern willow flycatcher is authorized.

f. You are required to furnish copies of all field data forms with positive or negative survey results, including copies of USGS 7.5 minute quadrangle maps and copies of any aerial photos used in surveying or reconnaissance to the Project Leader (see attached list). Photos and/or maps must clearly delineate all areas covered during each survey and the locations of Southwestern willow flycatcher detections. Results must be furnished by August 15, following each survey season covered by this permit.

2. Permittee is authorized to capture Southwestern willow flycatchers with mist nets, handle, band, collect genetic materials (blood, tissues, feathers), nest monitor, and nest search of any Southwestern willow flycatcher. The Project Leader shall be notified if these activities are conducted. Permittee is authorized to weigh, measure, age, sex, and band Southwestern willow flycatchers according to approved protocol and methods.

M. **Utah prairie dog**

1. Permittee is authorized to survey for Utah prairie dogs according to approved survey protocol.

2. Permittee is authorized to capture Utah prairie dogs (using live traps) according to protocols outlined in the Utah prairie dog translocation procedures which can be accessed http://www.fws.gov/mountain-prairie/endspp/protocols/protocols.html. Other methods may be approved in writing by the Project Leader (see attached list). All animals captured must be handled according to protocols outlined in the Utah prairie dog Translocation Procedures.

3. Permittee is authorized to weigh, measure, sex, and ear tag Utah prairie dogs and treat them for fleas or other pests or health issues. Blood samples (from toe clipping or venapuncture) and parasite samples (from combing) may be collected for genetics or disease detection as needed upon approval by the Project Leader (see attached list).

4. Permittee is authorized to translocate and release Utah prairie dogs to approved translocation sites according the approved Utah Prairie Dog Translocation Procedures.

5. Permittee is authorized to collect and hold dead Utah prairie dogs to be disposed of at direction of the Project Leader (see attached list).

6. Domestic dogs are not allowed in Utah prairie dog colonies. Firearms are not permitted in Utah prairie dog colonies unless carried by duly authorized Federal or State law enforcement personnel.

7. Permittee shall be aiding in research efforts to evaluate the effectiveness of imidacloprid oral flea control baits in reducing flea abundance and prevalence on wild prairie dogs. In 2009 and 2010, the permittee is authorized to distribute imidacloprid baits at the openings of active burrows or on the surface in 4 "treatment" Utah prairie dog colonies. Similarly, baits without imidacloprid may be distributed on 4 "control" sites. The imidacloprid baits will be distributed in April/May 2009 and 2010 at a rate of 6 pounds or less of imidacloprid per acre. When mixed with the palatable food mixture, this translated to approximately 100 grams of bait spread around each active burrow entrance.

8. Per the protocols for this specific research, the permittee is authorized to pre-bait and trap Utah prairie dogs with normal prairie dog baits using Tomahawk live traps (15.2 cm x 15.2 cm x 0.6 cm). Trapping techniques will follow the Translocation Protocol currently used by the UDWR. Protocol shall be obtained at http://www.fws.gov/mountain-prairie/endspp/protocols/protocols.html.

9. Permittee is authorized to anesthetize Utah prairie dogs with isoflurance gas in an anesthesia chamber, and comb each animal to collect and count the number of fleas. Each Utah prairie dog will have its appearance assessed, age will be estimated, sex will be determined, weight will be determined, and each ear will be tagged.

10. The allotted amount of mortalities authorized by this permit is 30 Utah prairie dogs. In the event that more than the allotted mortalities occur, permitted activities must immediately cease. The Project Leader and the Resident Agent in Charge (see attached list) **must** be contacted within 24 hours. The Project Leader must give approval before permitted activities may begin again. Disposition of mortalities will be at the direction of the Project Leader.

N. **Woundfin and Virgin River chub**

1. Permittee is authorized to capture (using seines, trap nets, trammel nets, and electrofishing), weigh, measure, PIT tag, and release juvenile and adult woundfin Virgin River chub in the Virgin River and all associated tributaries.

2. Permittee is authorized to take (capture, handle, hold, and kill) woundfin and Virgin River chub in all Virgin River reaches below Washington Fields Diversion (i.e., Washington Fields to Johnson Diversion, Johnson Diversion to Webb Hill Barrier, Webb Hill Barrier to State Line Barrier, Fort Pearce Wash, and the Washington Fields canals and drains). Take shall occur prior to the use of rotenone or chlorine for eradicating red shiners (*Cyprinella lutrensis*) which poses a serious threat to the continued existence of woundfin. Prior to chemical treatment, capture woundfin and Virgin River chub within the treatment zone, and subsequently transport, hold, and release these fish outside the treatment zone in the Virgin River and associated tributaries (i.e., lower La Verkin Creek). Lethal take shall not exceed 10% of the total number of endangered fish collected for translocation purposes. If lethal take exceeds this limit when translocation is considered complete, UDWR and the Service shall review and revise as necessary sampling protocols or this level of acceptable take. Every attempt shall be made to remove all woundfin and Virgin River chub from the subject area prior to chemical treatment.

3. Permittee is authorized to collect any dead woundfin or Virgin River chub from the treatment zone. Dead fish shall be used in parasite evaluations and other scientific research. All woundfin or Virgin River chub taken during authorized activities shall be catalogued and properly stored. Final disposition of the fish or any fish parts collected during authorized activities shall be at the discretion of the Resident Agent in Charge (see attached list). Lethal take of endangered Virgin River fish in the treatment zone shall not exceed 40% of the total number of endangered fish collected during the associated translocation activity. If

follow-up observations indicate this level of take was exceeded, UDWR and the Service shall review translocation protocols and/or this acceptable level of take and revise as necessary.

4. Permittee is authorized to capture, transport, and hold woundfin and Virgin River chub to develop genetically appropriate brood stocks at Wahweap State Fish Hatchery and Dexter National Fish Hatchery in accordance with the Virgin River Resource Management and Recovery Program guidelines.

5. UDWR hatchery personnel are permitted to transport and display in aquaria small numbers (<50) of hatchery reared, endangered Virgin River fish from their Wahweap facility for educational purposes. UDWR is permitted to maintain Virgin River fish in educational display aquaria at up to 6 locations throughout Utah. If mortality in the aquaria exceeds that expected to occur at the Wahweap facility, UDWR will contact the Project Leader (see attached list) and will re-evaluate this activity.

6. Permittee is authorized to mark (e.g., coded wire tags, injected elastiomers) and stock captive-reared woundfin and Virgin River chub into the Virgin River and its tributaries in accordance with Virgin River Resource Management and Recovery Program guidelines. Also permitted is marking and stocking of captive-reared woundfin and Virgin River chub into other water bodies as approved by the Virgin River Resource Management and Recovery Program. All recovery actions involving the movement of woundfin and Virgin River chub shall be coordinated with the Project Leader (see attached list) and the recovery team. In the annual permit report, UDWR shall summarize endangered fish production, characterizing expected and unexpected mortality. If any cohort of endangered fish experiences significant, unexpected rates of mortality, the Service shall be notified immediately.

7. In accordance with the Virgin River Resource Management and Recovery Program, permittee shall conduct activities, transport captive-reared woundfin and Virgin River chub to the FES or Utah Water Research Laboratory, Utah State University, Logan, Utah, for temperature and growth experiments. Final disposition of these fish after experiments shall be determined by the Project Leader (see attached list) and UDWR with concurrence by the Virgin River Resource Management and Recovery Program.

8. In the event of a fish mortality/morbidity event (fish kill), UDWR personnel are permitted to collect dead or dying Virgin River fish (including woundfin) to submit the carcasses for further assessments. In such an event, the Project Leader (see attached list) shall be contacted immediately.

O. **Gray wolf**

1. Permittee is authorized to enhance recovery, survival, propagation, and scientific research of endangered wolves under the following conditions:

   a. All handling and control efforts conducted with wolves must be coordinated with the Project Leader (see attached list) prior to any on-the-ground activities to ensure that all actions are consistent with recovery goals.

   b. Following coordination with aforementioned contacts, permittee may non-lethally "take" endangered wolves by implementing proactive strategies and conducting or directing non-lethal control actions (i.e., capture and aversion techniques) to reduce and/or resolve wolf-livestock and dog conflicts and human safety concerns.

2. Wolves may be live-captured for research or management purposes as directed by the Service.

3. Wolves shall be anesthetized to conduct an on-site health examination, including blood or DNA samples.

4. Captured wolves shall be released on site or translocated (as specifically directed by the Recovery Coordinator).

5. Wolves may be euthanized if sick, injured, diseased, or orphaned.

6. Permittee may salvage a dead specimen for scientific study; and aid in law enforcement investigations.

7. Collection and disposal of wolf parts/specimens (hides, skulls, etc.) for scientific and educational purposes is authorized after consultation and concurrence from Service law enforcement agents.

8. The allotted amount of mortalities authorized by this permit is 1 gray wolf. In the event that more than the allotted mortalities occur, permitted activities must immediately cease. The Project Leader and the Resident Agent in Charge (see attached list) **must** be contacted within 24 hours. The Project Leader must give approval before permitted activities may begin again. Disposition of mortalities will be at the direction of the Project Leader.

P. **Dwarf bear-poppy, Shivwits milk-vetch, Holmgren milk-vetch, Siler pincushion cactus, Clay reed-mustard, and Shrubby reed-mustard**

1. Permittee is authorized to collect up to 1 plant individual per newly discovered site as voucher specimens, not to exceed 1% of the population.

2. Permittee is authorized to preserve specimens in accordance with standard museum practices. Before expiration of this permit, all preserved specimens shall be properly labeled and deposited with a designated depository. Permittee shall supply a copy of this permit to validate that the specimens were taken pursuant to a permit. To determine the appropriate designated depository, please contact the Project Leader (see attached list).

3. In the event that a plant is accidentally damaged or destroyed, the permittee shall:

   a. Include a report of the circumstances that led to the damage or destruction. A description of the changes in activity protocols that shall be implemented to reduce the likelihood of such future damage or destruction from happening again should be included, if appropriate.

   b. Preserve any dead specimens in accordance with standard museum practices. Before expiration of the permit, all preserved specimens shall be properly labeled and deposited with a designated depository. The permittee shall supply a copy of this permit to validate that the specimens were taken pursuant to a permit.

   c. To determine the appropriate designated depository, please contact the Project Leader (see attached list).

Coverage under this permit is provisionary under the following restrictions:

Q. All activities shall be coordinated with the Project Leader (see attached list). You are to inform that office of all activities conducted under this permit.

R. Permittee shall obtain the required permits and conduct your activities in compliance with all applicable laws and regulations of the State(s), Federal, or tribal agencies upon whose lands you work. This permit does not grant the right of trespass. Such permission must be obtained from private landowners or the land management agency. Permittee and designated members of your staff must carry a copy of this and all other required permits at all times while exercising its authority.

S. Species and/or parts of species that are taken remain the property of the U.S. Fish and Wildlife Service. However, species listed on this permit may be sold, donated, or transferred only with written authorization from the Project Leader (see attached list).

T. If you wish to continue work with threatened or endangered species after expiration of this permit, your request for permit renewal must be received by the Permit Coordinator (see attached list) on or before November 30, 2012. Meeting this requirement allows you to continue authorized activities until your renewal application is acted upon. If this requirement is not met, this permit becomes invalid on the date of expiration. Any new activities or changes in activities with threatened or endangered species shall require that

your permit be amended. You are not authorized to conduct any new activities or to change any permitted activities until you have requested and have received a new or an amended permit.

U. Annual reports of all activities conducted under the authority of this permit must be submitted to the **Project Leader and Permit Coordinator** (see attached list) by March 31 annually. Failure to submit annual reports shall invalidate this permit. Your reports shall include complete accounts of all activities conducted under this permit including a discussion of any mortalities that occurred. If the allotted amount of mortalities for this permit were exceeded, the annual report shall also include a description of the actions taken (in coordination with the Project Leader) to address issues causing these mortalities; and an assessment of whether the new actions were successful at preventing additional mortalities. A renewal request shall not be processed until the annual reports are received. Please reference permit number TE-047266 when submitting annual reports or other correspondence regarding this permit.

List of Contacts:

Montana: Gray Wolf Recovery Coordinator, Ecological Services, 100 North Park, Suite 320, Helena, Montana 59604, telephone 406-449-5225 x 204

Canada Lynx Listing/Critical Habitat Biologist, Ecological Services 2900 4th Avenue North, Room 301, Billings, Montana 59101, telephone 406-247-7366

Colorado: Permit Coordinator, Ecological Services, P.O. Box 25486, Denver Federal Center, Denver, Colorado 80225, telephone 303-236-4256

Director, Upper Colorado River Endangered Fish Recovery Program, 44 Union Blvd., Lakewood, Colorado 80228, telephone 303-969-7322

Larval Fish Laboratory, Colorado State University, Fort Collins, Colorado 80523, telephone 303-491-5295

Tanya Shenk, Lead Lynx Reintroduction Researcher, Colorado Division of Wildlife, Wildlife Research Center, 317 West Prospect, Fort Collins, Colorado 80526, telephone 970-472-4310

New Mexico: Project Leader, Ecological Services, 2105 Osuna NE, Albuquerque, New Mexico 87113, telephone 505-761-4525

Resident Agent in Charge, Law Enforcement, 2415 Princeton Drive NE, Suite D, Albuquerque, New Mexico 87103, telephone 505-883-7828

U.S. Geological Survey-Biological Resources Division, Biological Survey Collection, Museum of Southwestern Biology, University of New Mexico, Albuquerque, New Mexico 87131, telephone 505-346-2870

South Dakota: Black-Footed Ferret Recovery Coordinator, Ecological Services, 420 South Garfield Avenue, Suite 400, Pierre, South Dakota 57501, telephone 605-224-8693

Utah: Project Leader, Ecological Services, 2369 West Orton Circle, West Valley City, Utah 84119, telephone 801-975-3330

Resident Agent in Charge, Law Enforcement, 9297 South Wadsworth Blvd., Littleton, Colorado 80128, telephone 720-981-2777

LIST OF AUTHORIZED INDIVIDUALS FOR
Utah Division of Wildlife Resources
Department of Natural Resources

Individuals authorized to conduct activities pursuant to this permit:

Jim Karpowitz and designated members of his staff:

Lynx and Wolf:
Kevin Bunnell, Keith Day, Craig McLaughlin, Tony Wright, Brian Maxfield, Kim Asmus, Anis Aoude, Bill Bates, Boyde Blackwell, Teresa Bonzo, Justin Dolling, and All Regional Wildlife Biologists

June sucker: Krissy Wilson, Cassie Mellon, Jackie Watson, Chad Landress, Doug Routledge, Roger Mellenthin, Rick Hartman, Chad Hill, Chris Crockett, Paul Thompson, Stuart Bagley, Samuel McKay, Michael Slater, Brent Anderson, Andy Allison, Kevin Landom, Brian Hines, and Eric Billman.

Colorado River fishes (Colorado pikeminnow, razorback sucker, humpback chub, and bonytail): Krissy Wilson, Leisa Monroe, Trina Hedrick, Michele Swasey, Matthew Breen, Paul Badame, Darek Elverud, Kenny Breidinger, Zane Olsen, Travis Dees, Phaedra Budy, Gary Thiede, and Jared Botcher

Virgin River fishes (woundfin and Virgin River chub): Richard Fridell, Amos Rehm, Kevin Wheeler, Melinda Bennion, Brook cox, Michale Painter, Pamela Wheeler, Zane Olsen, Travis Dees, Krissy Wilson, Brent Anderson, and Andy Allison

Desert tortoise: Richard Fridell, and Ann Meluckie

Black-footed ferret: Brian Maxfield, Charlie Greenwood, and Boyde Blackwell

Mexican spotted owl: Frank Howe, Jim Parrish, Keith Day, Tony Wright, and Brian Maxfield

Southwestern willow flycatcher: Frank Howe, Jim Parrish, Keith Day, Tony Wright, Pam wheeler, Nathan Brown, and Teresa Bonzo

Utah prairie dog: Keith Day, Blaine Cox, Jim Lamb, Kevin Bunnell, Nathan Brown, Teresa Bonzo, Jason Nicholes, Dustin Schaible, and Pam Wheeler

All plants: Ben Franklin and Robert Fitts

Each individual named above shall be responsible for compliance with the terms and conditions of this permit. The principal officer identified on box 8 on the face of this permit is responsible to ensure that the activities of all individuals listed herein are in compliance with the terms and conditions of this permit.

Individuals not named above may conduct activities pursuant to this permit **only** under the direct, on-site supervision of an above-named authorized individual.

5/14/09
Date

Deputy ARD – Fisheries-Ecological Services

This List of Authorized Individuals (List) is valid only if it is dated on or after the permit issuance date. This permit shall be considered invalid without this List.

To request changes to this List, the permittee shall submit a written request to the Project Leader (see attached list). The request shall include the name of each individual to be appended to the List; a resume of qualifications of each person to be appended to the List, detailing their experience with each species and type of activity for which authorization is requested; the names and phone numbers of a minimum of two references; and the names of individuals to be deleted from the List, if applicable.

cc: Jim Karpowitz, Utah Department of Natural Resources, Division of Wildlife Resources, P.O. Box 146301, Salt Lake City, Utah 84114-6301